Hippotherapy as early intervention for children with special needs

A study based on case studies of Spanish children with rare congenital disorders

Anabel Corral Granados

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Department of Special Needs Education

UNIVERSITY OF OSLO

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ABSTRACT

This project is designed to provide mental health professionals, educators and others, with current information on how horses can be used in therapy for rare congenital disorders. This information is used to define the theoretical basis of my thesis and to justify the hypothesis.

Purpose: Compile a literature review to further knowledge on the main characteristics of the syndromes of the two children in this study, diagnosed by rare genetic disorders, such as Robertsonian translocation 45, XY, t(13q, 14q) and unbalanced translocation (partial trisomy 11 and monosomy 4). Describe and explore holistic hippotherapy in children with these particular characteristics.

Method: The study focused on several exploratory case studies describing results of individual intervention with hippotherapy. Using a non random proposal sample of 2 children diagnosed with rare congenital disorders (atypical syndromes), aged 2-5 years. As a holistic study, the information was completed with the experiences of parents and psychologists (8 informants). Data were collected in face-to-face interviews with the mothers and psychologists, observation of the children using observation development scales (Battelle and Portage Guide to Early Intervention and Observation Assessment Scale) and text analysis (child's medical history and literature review). This will be accomplished with pre-test measurements, implementing the program and replicating the same tests several times.

Results: Both children have a positive development in a holistic way related with the therapeutic programme.

Conclusion: This study confirms the findings of other similar studies on the advantages of the use of hippotherapy in children with similar characteristics. The extensive information collected in this study offers the possibility of future replication with specific cases in controlled studies.

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CHAPTER 1 INTRODUCTION

Hippotherapy is one of the oldest therapeutic techniques. It has been used for its physical and emotional benefits since the times of the ancient Greeks, who used physical therapy on horseback to rehabilitate injured soldiers. Contemporary interest in the therapeutic use of the horse can be traced to 1952, after the achievement of Danish women who participated in the Olympic Games, stimulating a strong interest to apply similar programs in other European countries, especially for children with special needs (Rolandelli & Dunst, 2003). Recent studies report positive results as early intervention in children (e.g., Pesce, 2002; Benda, McGibbon, Grant & Davis, 2003; Casady & Nichols- Larsen, et al. 2004; Burton, 2005). In the literature consulted, there are very few studies in which the therapy addresses small children as the main participants, and none about children with rare congenital diseases; although it is well known that the therapy can be beneficial, leading to a better quality of life for persons suffering from chronic diseases. Hippotherapy is postulated as a positive influence on disability and dysfunction resulting from impaired health, positively altering limitations, and eliminating barriers to participation in contextual situations. This is the basis of the inclusion concept, and therapeutic riding provides a mechanism that allows students to be mainstreamed into general education environments to a certain extent, while simultaneously recognizing them as individuals. The concept of inclusion seeks to "establish collaborative, supportive, and nurturing communities of learners that are based on giving all students the services and accommodation they need to learn, as well as respecting and learning from each other's individual differences"(Salends in Rusty- Miller & Alston, 2004). In hippotherapy it's important to establish and improve the relationship between child, parents and the professional team; their collaboration makes the inclusion a reality. The inclusion concept involves the acceptance and sensitivity of individual needs and differences. In hippotherapy, the children have the main role and have the opportunity to feel they are an important part of the environment. Hippotherapy is a tool designed to develop the physical, social and cognitive skills of children, thus recognizing their individual needs (Salends in Rusty-Miller & Alston, 2004).

1.1. CHILDREN WITH RARE CONGENITAL DISABILITIES

In this introduction, I begin with a presentation of the characteristics of rare congenital disorders, followed by a review of research on the aetiology of such disorders, before proceeding to the presentation of this study. Finally, I describe the services offered for this group of children by Spanish health-care services, specifically a hippotherapy rehabilitation program.

1.1.1. Definition, prevalence and demography

Development is a dynamic, interactive process between an organism and its environment leading to maturation of the organic and functional nervous system, development of psychic functions and personality structure (Lerner, 2001). Development delays are defined as significant deviation from "the normal course of development "as a result of health events involving biological, psychological and social progress (McPhenson, Arango, Fox, Lauver & McManus, et al. 1998). A rare congenital disorder is a disease with risk of death or chronic disability which affects less than 5/10.000 people, and is considered a developmental delay. In the developed world, genetic and congenital disorders are the second most common cause of death in infancy and childhood, occurring in 25-49 per 100 of the cases. According to the World Health Organization, there are more than 5000 pathologies and syndromes listed as "rare congenital disorders" and with differing knowledge about their treatment, prognosis, prevention and cure (World Health Organization, 2005). It is difficult to estimate the incidence of developmental brain damage (prenatal, natal, postnatal causes), as the diagnostic categories are extensive and many of the diseases have no concrete aetiology (Manual Merck of diagnosis and therapy, 2003). Genetic alterations, intellectual disability and mental disturbances have mostly prenatal causes, whereas cerebral palsy and traumatisms have natal and postnatal causes. In Europe, the total number of patients with rare diseases is unknown; however, they represent approximately 8% or 10% of the Community population (EURODIS, 2005). In Spain, the female fertility rate, which has been declining since the late seventies, is now down to 1.2. The birth rate is 6.9 per thousand inhabitants and most

babies are born in public hospitals (about 85% of all children born). The average age for maternity has gone up to 30.64 and infant mortality has declined to 5.25%. Prematurely born children account for 7% of total births and congenital malformations have fallen to 0.9%. Twin births have risen from 0.7 to 1.5% and triplets from 0.2 to 0.7 of total births. In the light of recent surveys, child disability rates are thought to reach 2.2% in the zero-to-six age group (European Agency, 2006). In Spain, nearly 3-4% of newborns have some serious congenital defect. 7% of children under five years of age have such a defect, most of them with insignificant consequences. Intellectual disabilities are among the most serious alterations in around 3% of the population (Izquierdo-Martinez & Avellaneda-Fernandez, 2004). Most of the causes of intellectual disabilities are unknown, although it is easy to find the factors leading to congenital alterations during pregnancy: improper use of medication, alcohol abuse, x-ray treatment, malnutrition and some virus infections, such as rubella, and causes related to metabolic alterations, such as phenylketonuria and congenital hypothyroidism.

1.1.2. Options for intervention in Spain

Child development is a dynamic and complex process and is dependent on biological, psychological and social progress. The first years of life are a critical stage which configures the perceptive, motor, cognitive, linguistic and social abilities that make possible balanced interaction with the child's surroundings. In 2000, the most important document in the history of intervention for children with special needs in Spain, the "Early Intervention White Book" was published by various organizations with governmental support (Grupo de atencion temprana, 2000). The White Book maintains that early intervention should follow a comprehensive, holistic bio-psychosocial model which considers a complex set of activities addressing child, family and community needs. They describe early intervention as any intervention addressing the 0-6-year-old population, their families and surroundings, which has as its main purpose the quickest possible response to the temporary or permanent needs of children with developmental disorders or risk of their appearance.

Such intervention must consider the child as a whole, and must be planned by a professional team with interdisciplinary or transdisciplinary orientation. Children with disturbances in their development depend to a great extent on early detection and intervention from the beginning. The less time they are deprived of stimuli, the more opportunities they will have to make use of cerebral plasticity, and the fewer the delays. In this process, parental participation is crucial, as an indispensable contribution to affective and emotional interaction and treatment efficacy. Early intervention offers children with impairments or with risk factors, a set of optimized and compensated actions that facilitates their adequate maturation in all areas and makes it possible to arrive at their maximum personal development and social integration.

Goals of early intervention are:

- Diminish the above deficiencies and deficits in the child's overall development.
- Optimize the course of the child's development.
- Introduce the necessary compensation mechanisms, removing barriers and adapting to specific needs.
- Avoid or reduce secondary effects that emerge and deficits produced due to delayed development or high-risk situations.
- Attend all the needs of child and family, considering the child as an active subject.

The "White Book" is a very important step forward, and interdisciplinary consensus has been shown to be a useful tool in changing professional and political attitudes.

1.1.3. Health-care services

Historically, lists of conditions, functional impairments and disabilities have been used to identify target populations for programs serving children with chronic conditions. Children with special health-care needs are those who have or are at increased risk of a chronic physical, developmental, behavioural, or emotional condition and who also require health-care and related services of a type or amount beyond that normally required by children. The European Agency for development in

Special Needs Education (2006) elaborated a report based on cases studies in 15 European Countries. After analysing the current situation in Spain for children with rare diseases and their relations with the health system they concluded that: because these diseases are chronic, normally irreversible, or degenerative, patients have a lifelong dependence on the health system, and their evolution, treatment and after-effects impair the quality of life of the patients and their families. The primary consequence of not knowing about these diseases is that the patients and their families suffer incertitude, helplessness, distress and other pathological manifestations. The diversity of disease-related situations and treatment makes it difficult to find anything in common that allow these rare diseases to be grouped together. There are two determining processes found in both minority diseases and the health system: diagnostic research and lifelong treatment. Diagnostic research is a difficult moment for the patient and family, because the incertitude generates unstable emotional health. The main problem is to make the diagnosis in the least time possible. Possible difficulties include:

- There is an information deficit at all professional levels, mostly lack of epistemological data resulting from difficulties in recognizing the disease.
- The Spanish health-care service has many organizational problems, such as lack of service coordination, long waiting times between consultation appointments, difficult access to tests or treatments, etc.
- The chronic and incapacitating nature of the disease means that communication of the diagnosis of a minority disease will have an emotional impact.

Due to all of the above, it takes a long time to arrive at the diagnosis. The easier and more quickly the diagnosis is made, the greater the impact, and the emotional state does not suffer an additional previous impairment.

1.1.4. Services for children with disabilities in Almería

In Almería as a Spanish province, all children receive diverse services and programs on four different levels: European Union, Spanish Government, Andalusian Regional Government and the Almeria City Council. The services responsible in Spain for child at risk are described in the project summary of all European Services by the European Agency for development in Special Needs Education (2006). In Andalusia, Law 1/1999 of 31st March on disabled persons in Andalusia should be emphasized (Ley de atención a las personas con discapacidad, 1990).

Health Services: All the hospitals have specialised neonatal and postnatal hospital-based paediatric services: ECI-guided neonatal unit care has been increasing in recent years. Neuro-developmental follow-up attention is provided babies at risk or with specific disabilities or chronic illnesses, and each child receives annual evaluation. There are some rehabilitation units staffed by a team of physiotherapy, occupational therapy and speech therapy professionals, however, in Almería, only physiotherapy is available and this only one hour a week for each child. Centre-based primary paediatric teams are specialized in growth, vaccination, developmental charts, common illnesses and testing. The majority of the services are decentralised and family-centred.

Education: The situation is variable in the Regional communities. In Andalusia, there is a special-needs education team in each province. In Almería, where the population is 500.000, there is one psychologist for every four schools. Pre-primary schools offer teacher services in hospitals, home and special education centres.

Social affairs: Evaluation and assessment is done by early intervention teams. The team in Almería assesses “percentile of incapacity” for use by the parents to document the right to economic assistance or access to services. Such social services are usually called “impairment-centred”, and are dependent on initiatives of professionals, universities, parents’ associations or NGOs.

Children and public and private entities working with early intervention programs are the main recipients of economic aid from the Andalusian Regional Government. The Centre for Equestrian Arts of Almería, in close collaboration with the University of Almeria and the Neuropsychological Evaluation and Rehabilitation Centre, has been one of the beneficiaries since 2003. This collaboration is based on: advising on neuropsychological intervention techniques, neuropsychological evaluation and traineeships to encourage the centre's activities. At the Centre of Equestrian Arts, a group of psychology professionals works with children from two to six years of age in a hippotherapy early intervention programme. The underlying philosophy of their intervention is based on the application of neuropsychological rehabilitation principles. These processes involve an individual analysis of the cognitive and emotional deficits of each child and programming of adapted intervention according to their needs. To date, the centre's hippotherapy programme has attended thirteen children with autism, nine with Down's syndrome, six with Cerebral Palsy and two with genetic alterations.

1.2. SUMMARY

This chapter defined and described "rare congenital disabilities" as the medical term used for the contextual situation of the two children who are the subjects of this study. Such disabilities create a life long dependency on health services and a need for a complete program of services. Hippotherapy is one of several programs offered to this group of children and the main topic of this thesis, it is a firm starting point for the theoretical overview of the syndromes discussed in Chapter 2.

CHAPTER 2 THEORETICAL OVERVIEW OF CHILDHOOD DISORDERS

This chapter presents the significant clinical characteristics of the disorders diagnosed in the children described in this thesis as defined in the literature.

2.1. ROBERTSONIAN TRANSLOCATION

The child has not yet been diagnosed and medical opinion does not consider the Robertsonian translocation the only cause of his impairment. However, cases of children with this kind of genetical abnormalities and serious developmental delays are found in the literature. The Robertsonian translocation is a common significant chromosome rearrangement that is formed by fusion of the whole long arms of two acrocentric chromosomes (chromosomes with the centromere near the end), reducing the number of chromosomes by one, and leaving the child diagnosed as having Robertsonian translocation with a total of 45 chromosomes (Winking, 2001). Different types of handicaps are caused by the chromosomal abnormalities. These depend on exactly how much chromosome material is missing. The genetic risk in such a situation depends entirely on whether there is an abnormality in the parental chromosomes. There is a 25% probability that the parent's chromosomes are abnormal; in the case of the child studied here, it is in his mother's genetic configuration is. Studies say that the risk in offspring is only 10%, because this type of chromosomal translocation creates infertility (Harper, 2001).One in about 900 babies is born with a Robertsonian translocation and normally causes a syndrome of multiple malformations and mental retardation (Medical Dictionary, 2003). The most frequent forms are between chromosomes 13 and 14, between 13 and 21 and between 21 and 22. In our case, the child has an unbalanced form of chromosomopathy, which is unusual, with few related cases in medical history. In 1974, chromosome 13 problems were studied by Schinzel et al., who published case reviews. The children had microcefalia and mental retardation at less than one year of age. Funderburk and

Landau (1976) described the case of a young, 20-year-old patient of normal stature, severely mentally retarded, and with very poor language development (Temple, Cockwell, Hassold, Pettay & Jacobs, 1991). Cotter and Steward (1990) reported the case of a girl with the same chromosomepathy and similar characteristics, blepharaphimosis, depressed nasal bridge, small ears, protruding philtrum, short neck and small thorax, short long bones and coax valga. Temple, et al. (1991) studied other Robertsonian translocations in the same chromosomes, 13 and 14, in a young child 5% physically smaller than normal, formal bossing, broad forehead, fleshy nasal tip, short philtrum, high-arched palate, undescended testes, early puberty, small hands, scoliosis, hydrocephalus and developmental delay There is very little information published about children with these syndrome characteristics in all the literature consulted.

2.2. NON-BALANCED TRANSLOCATION(MONOSOMY AND TRISOMY)

The child was diagnosed with both monosomy and trisomy and unbalanced translocation of genes. Considering the complexity of the terminology, it is important that it be defined before reviewing the literature about the specific case.

If one or another of the parents carries a balanced translocation, it is possible for a child of theirs to inherit a rearrangement of the chromosomes in which there is a bit of extra chromosome material or a bit missing. Either of these would be known as an unbalanced translocation, which can, unfortunately, cause serious mental and physical handicaps in the child who inherits them. Sometimes it cause miscarriage, but not always. A test in pregnancy can examine the foetus's chromosomes if the parents carry the balanced translocation rearrangement and are therefore at risk of having a handicapped child. Both monosomy and trisomy can result from non-disjunction in meiosis. Genetic trisomy is the presence of an extra chromosome. The majority of trisomies compatible with survival are the Down's syndrome (Trisomy 21), Patau´s syndrome (Trisomy 13) and Edward's Syndrome (Trisomy 18).

Monosomy is the absence of a single chromosome and is almost always incompatible with survival to term (Mueller & Young, 2001). The only other case found with a prenatal diagnosis of my patient's chromosomal configuration, Monosomy 4p and Trisomy 11, was in Taiwan in 2005. They concluded that their case was unique, but they only describe the physical characteristics of the child. The mother chose to terminate pregnancy and consented to necropsy at 23 weeks of gestation. The foetus had multiple dimorphic features, including cleft lip, cleft palate, and scalp defect with underlying bony defects, prominent glabella, hypertelorism, thick eyebrows, short philtrum, misshapen low-set ears, preauricular dimples, broad nose, short neck and migrognathia (Peng, Wang, Chao, Chang & Chan, et al. 2005). The authors report that a Monosomy 4 diagnosis in foetuses is rare, and in all English-language literature, only two prenatal cases have been described. Almost all the cases are interrupted when the doctor makes the diagnosis, because the children have severe anomalies. Carriers of chromosome 4 inversion are at risk of having unbalanced offspring with Wolf-Hirschhorn syndrome, a rare chromosomal abnormality caused by loss of material from the distal aspect of the short arm of chromosome 4. Characteristics include marked prenatal and postnatal growth retardation with psychomotor delay and congenital hypotonia, mental retardation, distinctive faces with high nasal bridge and maxillary hypoplasia, midline defects and seizures (Escudero, Lee, Stevens, Sandalinas & Munné, 2001).

2.3. SUMMARY

Rare congenital disorders are complex conditions, and as unique cases, have heterogeneous symptoms difficult to define. From this theoretical overview we know that these two children were developmentally delayed and that they could improve their capacities using hippotherapy as an early intervention. In the following chapter a theoretical overview of hippotherapy is presented.

CHAPTER 3 THEORETICAL OVERVIEW OF HIPPOTHERAPY

Hippotherapy literally means “Therapy with the help of a horse” and is derived from the Greek word hippos, meaning “horse”. Hippocrates was the first to describe the benefits of hippotherapy for rehabilitation. He called riding a universal exercise with a “healing rhythm” (Mayberry, 1978; Riede, 1987; Fine, 2000). The value of horse riding for the physically disabled has been known since 1875, when Chassingne, a physiotherapist, noted that, as a result of the riding experience, the rider’s balance was improved, muscles were strengthened, joints became more supple, and there was a marked improvement of the rider’s morale (Bertoti, 1988). More recently, in the 60s, therapeutic riding centres emerged throughout Europe, Canada and the United States. Horses have been a part of physical therapy since the early 70s and are more reticently playing a role in the field of mental health.

3.1. HIPPOTHERAPY

How children with disabilities can benefit from riding will depend firstly on whether the disability they have is mental or physical, and secondly, on the type of riding therapy offered. The use of horses within a therapeutic setting falls under four broad categories: evaluating, hippotherapy, riding therapy and riding for rehabilitation (Biery, 1985). This report concentrates on hippotherapy as a primary early-intervention therapy. Barbara Heine (1997) theorized that there are two types of hippotherapy, classic and modern.

3.1.1. Classic hippotherapy

This therapy reflects the German model which has been practiced throughout Europe since the 1960s. Hippotherapy is always performed with a rider and at least one therapist and a horse. The therapist uses the three-dimensional movement of the horse’s back as an apparatus to manipulate the patient’s passive body (Grobler,

2004). The treatment consists entirely of the horse's movement and the patient's responses to that movement.

3.1.2. Modern hippotherapy

Present-day therapy is a treatment approach that uses the movement of the horse as in classic hippotherapy in addition to psychological treatment. It is used to achieve physical, psychological, cognitive, social, behavioural and educational goals as a multidisciplinary form of treatment that can be applied by a physical therapist, occupational therapist, psychologist or psychotherapist. This treatment approach uses meaningful activities with the horse, donkey, pony or llama that specifically address the patient's individual goals. The American Hippotherapy Association (2003), the largest hippotherapy association in the world, defines hippotherapy as a physical, occupational and speech therapy treatment strategy that utilizes equine movement (Engel, 1992). Therefore functional riding skills are not taught, and it is a perfect technique for early child therapy. According to Bukovek (2005), hippotherapy has been used to treat children with a wide range of disabilities, including autism, cerebral palsy, communication disorders, CVA stroke, and developmental delay, Downs syndrome, language disabilities, multiple sclerosis, muscular dystrophy, spinal cord injuries, traumatic brain injuries and hearing impairment.

3.2. THERAPEUTIC HORSE RIDING FOR CHILDREN WITH SPECIAL NEEDS

It is normally assumed that hippotherapy is more related to children than adults. According to Dyer (2000) "children and horses share a commonality of a prey relationship", and he proposed that in developmental stages, children may see themselves as animals who have been rejected and abused and more readily identify with the perceived vulnerability of animals than adults. Other authors, like Freud, wrote that children show no trace of that arrogance which urges adult civilized men to draw a hard-and-fast line between their own nature and that of all other animals. "Children have no scruples over allowing animals to rank as their full equals" (1913,

cited in Martin Taylor, 2001). Working with horses provides the therapist with an object in space (other than the self) in which to promote projection and identification. Barker (1999) related the Erickson stages of psychosocial development with the potential benefits of the relationship between the child and the horse. She suggested that the horse contributes to the development of a child's basic sense of thrust through the its constancy, security, reliability, love and affection, and ability to serve as a transitional object; a sense of autonomy and initiative through the horse's serving as an active playmate and promoting exploration of the environment, and encouraging patience and self-control; a sense of industry through the horse's trainability and response to the child's basic commands and a sense of identity through the horse's serving as a companion and confidant, and providing social and emotional support.

3.3. A CONCEPTUAL FRAMEWORK FOR HIPPOTHERAPY

Throughout the history of psychology, the correspondence between early intervention in the delayed motor characteristics of most children with special needs and later implications for their cognitive development has been followed and observed.

3.3.1. Background

Vygotsky (1962) theorized that the development of thought is determined by language and the sociocultural experience of the child. He explained that children grow intellectually through feedback from their environment. Therefore, all significant others such as teachers, peers, and parents have an enormous impact when assisting the child to expand and modify existing cognitive structures. This author particularly emphasized the significance of language as a social means of thought, which is role-modelled, practiced, and reinforced with role-play during group therapy with children (Vidrine, Owen-Smith & Faulkner, 2002). The Piaget positions, as interpreted by classic developmental psychology, identify sensory motor interactions with real objects in the environment as the foundation of cognition (Piaget in Mc

Lean, 1986). According to Piaget the objects must be acted upon in order to be known. This author said that early cognition consists of operative schemes for doing rather than perceiving. The implication of this theory is that the more frequent and varied infant motor behaviour is, the more knowledge the infant possesses and the faster it develops new knowledge. Gibson, in 1979, proposed another similar theory. The major premise in this theory was that perception rather than motor activity was the primary means of developing cognition. According to him, the information is available to the child directly from an object without the necessity of action; the perception of these stimuli is cognition. But experience, including increasingly complex motor interactions, attunes the perceptual systems to increasingly finer features of a stimulus, rather than differentiating it from others. Until the 80s, when hippotherapy was institutionalized, many theories postulated some role for motor activity in cognitive development, but none of these have clearly defined the strength of this relationship or which of the components is antecedent in the development.

3.3.2. Current theoretical framework

Hippotherapy is conceptually based on current theories of motor development and control, and the use of this therapy has established certain neurophysiologic treatment principles. The conceptual framework of hippotherapy may be explained by dynamic system theory along with the theory of neuronal group selection and sensory integration theory.

3.3.2.1. Dynamic system theory

This theory maintains that the complex human system continuously interacts, adapts and modifies relative to the dynamic, interrelated and changing factors within the person, task, and environment (Lewis, 2000). This theory argues that behaviour is the result of interaction among multiple subsystems (motor, cognitive, posture control, central nervous system, etc) and environmental conditions. Development is considered an organized process which is divided into different stages from stability to instability, and depending on whether they have the desired effects on the new

conduct. In accordance with this hypothesis, the child's activity and exploration determine the acquisition of new behaviour. The moment at which this new behaviour is acquired is determined by the surrounding conditions (Hernández, 2003). Dynamic system theory claims that all developmental outcomes can be explained as the spontaneous emergence of coherent, higher–order forms through recursive interactions among simpler components. This process is called self-organization, and it accounts for growth and innovation throughout the natural world, from organisms to societies to ecosystems to the biosphere itself. According to McGibbon and Haehl (2002), the movement patterns of the patient in hippotherapy emerge as a result of the self-organizing process involving the interaction of multiple constraints (see Table 1).

Table 1.- Constraints that may act as control parameters during hippotherapy

Individual	Environmental	Task
Strength	Terrain	Patient position
Stiffness	Therapist cues	Horse's size
Mass	Temperature	Horse's movement
Arousal	Noise	Equipment
Motivation	Gravity	Horse's speed and direction

The main constraints that can act as control parameters during hippotherapy are postural control, arousal, motivation, temperature, and the horse's movements and rhythm.

A) Postural control as an organization system: organizes the biomechanical tasks of standing and walking (sometimes called "controlled falling"). Characteristics: uses multiple sensory inputs to continuously determine the body's position and movements, uses the central nervous system to integrate the sensory information and organize rapid responses and uses effecter systems such as muscles and joints to carry

out the instructions from the central nervous system (Van Der Heide, Fock, Otten, Stremmelarr & Hadders-Algra, 2005).

B) Arousal is a state of alertness and mental and physical activation. Thayer (1978) was one of the best known researchers in self–reported arousal. He maintained that strong instigation of a pleasure (for example, hippotherapy) creates an effect of arousing the child. As other variables can affect the positive or negative instigation or level of arousal, such as the time of day or the effect of physical exercise, it can be of great help in increasing the arousal level if hippotherapy and exercise are done at the same time, around midday (Eysenck, 1982).

C) Motivation. Authors as Lewthwaite (1990) studied personal and social-environmental motivational influences in contexts of physical activity. Motivation is defined as a process in which internal and external factors direct and energize thoughts, feelings, and actions. It is described as a consequence of meaning, which is derived from a combination of personal and social factors, including personal goals or incentives, expectations of personal efficacy, movement-related perceptual and affective experiences, and social and physical features of the environment. McGibbon and Haehl (2002) said that hippotherapy provides motivation for the child to actively engage in the treatment because: the therapeutic task demands and encourages participation, the outdoor environment and exercises with the horse are pleasurable and the presence of the child's family during the therapy is a major factor in motivating the child.

D) The temperature of the body of the horse is four or five degrees higher than a human's, mainly in the mane, crest and quarters. Relaxation exercises on the horse's back allow the rider to absorb more warmth, and the massaging motion from the horse enhances an overall sense of rest and relaxation. This extra warmth can help reduce spasticity and stretch muscles (Scott, 2005).

E) Horse movements. In the therapy, the professionals use the movements of the horse to mimic normal human development to establish postural control. For

example, in developing postural control in a child with a developmental disability, a therapist may begin working in front/back, decreasing or lengthening the horse's stride while the rider sits normally atop the horse. The therapist may then control the horse from the side, and have it move in large circles. Then, therapist and rider may work on developing rotation through activities requiring reaching and crossing body mid-line while riding the horse. This series of postural control exercises from front/back to sides to rotational follows a normal developmental sequence (Rusty-Miller & Alston, 2004). When the horse moves, the rider is constantly thrown off balance, requiring the rider's muscles to contract and relax in an attempt to rebalance. This exercise reaches deep muscles not accessible in conventional physical therapy. Stretching of tight or spastic muscles is also a good benefit. Sitting on a horse requires stretching of the adductor muscles of the thighs. This kind of movement is improved with the hippotherapy activities and they provide rich multi-sensory information and challenging of multidimensional movements (Miller & Alston, 2004).

F) Rhythm is a main component in our patterns of movement and it is one of the characteristics of the horse's movement that his multidimensional swinging rhythm is transferred to the patient's pelvis in a manner that duplicates the normal human gait. Rhythm was described by Wolff in 1967 and 1968 as a crucial aspect of movement. He suggested that one of the main roles of spontaneous movement was its contribution to the later development of serial ordering for both cognitive and motor behaviour (Wolff in Piek, 1995). Riding a horse should be a consistent and repetitive rhythmical movement experience and is the treatment tool for achieving the goals of strength, balance and normalizing muscle tone (Narha, 2006).

3.3.2.2. Theory of neuronal group selection

This theory is related to neurobiology and behaviourist research. It is based on three main assumptions: A) Anatomic and structural brain evolution has a specific function, neuronal plasticity. It plays an important role in the organization of the brain. B) Experience as a factor in the selection of certain patterns of fixed response.

There is neural diversity, no points to indicate genetically predetermined wiring, only a "rough palette" for experience (exploration). It depends on selection: strengthening of connections among groups of neurons with experience. All of the children's experiences make new brain connections. All human beings have this capacity to create new connections in their lives. C) The appearance of maps and neuronal endograms has recorded the interaction of structure with the environment that causes unique behaviour in each individual. The re-entering neurons are groups of neurons located in different areas of the brain and they activate reciprocal and recursive signals from many other groups (perceptions are linked to actions and in the same way they are linked to perceptions…) (Hernández, 2003).

3.3.2.3. Theory of sensory integration

According to Melanne Randall (2006) the basic sensory and motor components which influence learning and behaviour are: auditory processing, body awareness, coordination of the sides of the body, fine motor control, motor planning, and ocular control, perception of movement, perception of touch and visual-spatial perception. A. Jean Ayres (1972, 1979) suggested that all our senses have to work together in harmony. In other words, our senses of touch, smell, taste, sight and sound, as well as our physical movement and body awareness, all have to work together. Sensory integration occurs when riding stimulates the tactile sense both through touch and environmental stimuli. The vestibular system is also stimulated by the movement of the horse's change of direction and speed. This system is located in the inner ear and has three semicircular canals, which are filled with endolymph fluids. These channels are sensitive to movement and the movement of horse riding in particular activates these channels, distributing certain sensory inputs to the rest of the brain, promoting vestibular stimulation. The olfactory system responds to many smells involved in a stable and ranch environment. Vision is used in controlling the horses. The many sounds of the ranch help to involve the auditory system. During hippotherapy sessions the rhythmical motion of the horse produces both vestibular and propioceptive input for the rider. Slow vestibular input is calming and organizing for

the central nervous system. Propioceptive input, which is also calming to the central nervous system, is felt through the joints and tendons of the hips, trunk, and neck of the rider. All these senses work together and are integrated in the act of riding. In addition, proprioceptors (receptors that give information from our muscles, tendons, ligaments and joints) are activated, resulting in improved proprioception. This sensory input is interpreted by the brain, resulting in an adapted response by the rider. The simultaneous combination of both vestibular and propioceptive input contributes to a decrease in gravitational insecurity by way of calming the rider's central nervous system (Miller & Alston, 2004; Scott, 2005).

3.3.2.4. Recapitulation

These postulates about child development have important implications for therapy. The interactive nature between organic subsystems and the environment emphasizes the importance of providing therapeutic programs directed at all the components that interact in development. And the possibility of neuronal plasticity is easily influenced by the context, which suggests the high potential of therapeutic programs implemented as early intervention.

3.4. HOW AND WHERE THE THERAPY TAKES PLACE

The therapy was structured in three stages, evaluation, design of the rehabilitation program and intervention. The second stage is done by the Andalusian Horse Riding Federation and is duly licensed. The programme started in September at Almería University, because July and August are the holiday season in Almería. A group of psychologists from the university and from the hippotherapy centre and I met the parents of the children at the CERNEP Centre. This centre is devoted to the evaluation and/or rehabilitation of persons with deficits in basic psychological functions, such as learning, attention, perception, memory and language. The team and I prescribed hippotherapy as a specific treatment with set therapeutic goals for the disabled children. Our first tasks were to find the disabilities of the population

being served, perform rider evaluations, write progress reports, select horses and develop the full collaboration of the team members.

The intervention provides the opportunity to move the therapy outside the therapist's office to the "Indaliana School of Equestrian Arts ", located in a village approximately 15 kilometres north of Almería. The ranch is used for several lessons, but only when other therapeutic riding program lessons are not in progress. The centre is quite large, and has four stables, a large tack room, and office, a meeting room and three illuminated open riding arenas replete with music and handicapped-accessible ramps. The University of Almeria and the Andalusian Government have agreements to work there as an approved early intervention centre. There are two professional riding instructors, four hippotherapy psychologists, one external physiotherapist and several volunteers from a psychology and physiotherapy Master's Degree program. The two training instructors have had 15 years of experience working with horses and special curricula related to hippotherapy and psychology.

The four psychologists have had previous experience as therapeutic riding instructors and each is assigned to one child in the group as their first instructors. They have several jobs, as they also assign and supervise the duties, jobs and responsibilities of two assistants/volunteers for each activity; exercise and feed the horses used for therapeutic riding, set and maintain safety standards, supervise riding arena preparation and conduct therapeutic riding lessons.

Volunteers are the main assistants in the therapy sessions and are responsible for the safety of the rider. During the activities, they walk on either side of the horse, holding the child firmly on the bareback pad, one supporting his thighs and the other at the horse's back seeing that the child's spine is straight and offering smiles and praise.

One month before starting the therapy, all the volunteers and the team take a helper training programme similar to that of the "American Handicapped Association" (Engel, Galloway, & Bull, 1994). Riding instructors and team meet to reach the

following goals: Define the roles, structure and objectives of the group, present a summary of the handicaps accepted at the centre and experience from previous years.

From the first day, the team work with the volunteers so they can get to know the place, the activities and to an overview of the hippotherapy activities. All the special equipment that might be used with the group is shown and explained, and how each is adjusted and used. They are taught and demonstrated horse handling, first catching the horse and later how to tie it up correctly, and they are shown mounting and dismounting methods and techniques.

Activity scheduling in the therapy can be achieved by learning to develop a plan for caring for an animal throughout a day. We prepared a general guide for intervention so each professional could see the main parts of the therapy:

1. Preparation and work on the ground. During the sessions, the therapist models the child's thought and behaviour. In particular, the working relationship between the therapist and the horse-riding professional is a model for open communication, respect, thorough processing, decision-making, and cooperation. Effective communication with a horse involves patience, understanding, attention, forgiveness, and consistency. The child will be in the presence of both established and developing relationships which are both verbal and nonverbal. It is important to start working with a conceptual approximation between horse and child, and to establish previous knowledge schemas as a basis for developing new related knowledge. Our children have problems with abstract concepts and it is better to focus on sensor-perceptive experiences.

2. Specific work on the horse. The team agrees to work with she-donkeys during the first semester and then change over to the ponies. For approximately 30 minutes, the child learns to clean, care for and mount the animal.

3. Relaxation could be performance by lying back on the quarters, gradually building up movements over a period of time (Davies, 1988). The object is to lie back over the cantle of the saddle until the shoulders and head are resting on the donkey's quarters.

To do so, the child should remove both feet from the stirrups and then fold his arms. Looking straight ahead or at the donkey's ears, he then slowly lowers his back until his shoulders touch its quarters, allowing his head to finally rest just above the top of the tail. The farm where the hippotherapy is performed also brings with it some real objects which are not typical of the therapy room. This situation provides a wide range of opportunities for a child to be assured of boundaries in the new space and around the horse. There are 20 horses, 3 ponies and 5 she-donkeys at the centre. The riding instructors make a selection of sizes and shapes necessary to meet each child's unique requirements. For example, they decided to use donkeys for the first contact with the children because they are much more docile and quieter than the horses. The space is large and there are enough animals to give the parents the chance to have a flexible schedule on Saturday mornings. Each child rides once a week during an approximately one-hour lesson. The therapy is planned as a routine with fixed days and times for working with the child individually. The lessons last from 45 to 60 minutes, allowing 15 minutes for mounting and dismounting.

3.5. THERAPY EFFECT STUDIES

Numerous terms are used to describe the roles that horses play in educational, physical, cognitive and psychological therapies. The following are included under the therapeutic umbrella: equine therapy, hippotherapy, equine-facilitated psychotherapy and equine-assisted therapy (Quirot, Jimenez, Mazo, Campos & Molina, 2004). All of them are used to describe the following studies:

According to Reichert (1998), hippotherapy represents a good alternative to traditional therapy. The use of animals in therapy always creates a situation where the need for language decreases. For instance, the therapist may have to depend more on the child's physical communication (i.e., the child's posture and facial expressions), which can assist him in knowing the child better and helping him to learn how to interpret what the child is trying to communicate. Normally only oral communication

is used in conventional therapy. It is important to note that hippotherapy is not appropriate for all children. It is not recommended for children with a history of aggression towards animals (Reitcher, 1998). Hippotherapy is an aid in the prevention of future complications. Treatment may also serve to facilitate the child's most appropriate development and teach compensatory skills. The child may need extra stimulation through treatment programs that incorporate the use of sensory stimuli (e.g., the feel of the horse, outdoor sounds, movements, new animal smells).

Hippotherapy literature defines several benefits:

3.5.1. Psychological benefits

Naomi Scott (2005) related hippotherapy to the release of endorphins and feelings of emotional well-being. Among other benefits is the empowerment one feels by regaining a sense of control over one's own body. McConnell (2002) agrees that hippotherapy offers patients psychological benefits. For example, it can help patients improve their range of motion and strength (by brushing or petting animals), diminish signs of stress and reducing the need for pain medication. In 2004, Macauley and Gutierrez examined the effectiveness of hippotherapy versus traditional therapy in children with language learning disabilities in 3 boys aged 9, 10 and 12 years. They reported positive effects in speech and language abilities and additional benefits of improved motivation and attention. During informal interaction with the horse, a child uses a number of different types of explorative behaviour (i.e., fine discrimination, visual examination, etc.) to examine the horse's responses and behaviour as a social being. The child's emotional responses are also elicited by an equine-facilitated psychotherapy, e.g., self-efficacy and self-esteem (Beck & Katcher, 1996). Rufus (1997) also found enhancement in self-concept. Graham (1999) cites the positive effects of stroking horses in a recent Japanese research study in three groups of children, one of which was made up of individuals who had negative attitudes towards animals. Participants experienced a decrease in tension after stroking the horses.

3.5.2. Social benefits

Beck & Meyers (1996) describe animals as an important feature of children's social network. Children can learn values and attitudes through their interaction with the animals. These authors show evidence that the mere presence of animals positively alters children's attitudes about themselves and increases their ability to relate to others. Moreover, they accept that animals are catalysts for social and verbal interaction in children. In the opinion of Taylor (2001), another important author who worked as a therapist for children with special needs, children diagnosed with disorders can think about their own behaviour and needs, which normally aren't easily understood by them, through the animal. Because they view an animal as a social being, the projection of feelings regarding peer interaction is readily available. Often children with special needs have difficulties in bonding close friendships, but in equestrian settings, for example, the horse becomes the focus of attention. The child develops a friendship with his horse, often talking to him about his innermost feelings and thoughts (Rolandelli & Dunst, 2003). An important factor is that the horses are nonverbal. This situation gives the rider the freedom to express himself fully without fear of objection or criticism. Many children spend many hours a day isolated from the real world, especially children with special needs. In riding, as a social activity, there are normal social interactions at different levels; on the first level, the child has the opportunity to share experiences and stories, especially with peers who come to the group or other sessions. On another level, the child must develop relationships with the assistants needed in the therapy sessions in order to communicate more successfully with the horse. On the third level, when the child has left the therapeutic setting, he returns to the world eager to report his riding experiences to those around him. In the hippotherapy session, the child acquires socially acceptable ways to express feelings. For example, when he observes and interacts with the animal and discusses the ways the animal expresses its feelings and what behaviour the patient finds acceptable (e.g., prancing, nuzzling) or unacceptable (e.g., face-licking, neighing) (Britton, 1991).

3.5.3. Cognitive benefits

These benefits are theoretical, because there has been no research on the subject. Examples of exercises working on learning skills for functioning in the world:

A) Sequencing task; a single task using a series of steps done one at a time in which some children with special needs can learn to put the steps together in the right order can be helpful in the child's daily life. B) Multi-tasking makes the child able to handle different tasks at the same time. C) Using sensory integration; Mel Randall (2007) describes several examples in his paper on "helping children learn through sensory integration" that can be adapted and used in hippotherapy. Understanding auditory information requires the ability to discriminate sounds and plays an important role in language development. The ability to coordinate the right and left sides of the body and cross the midline of the body is an indication that both sides of the brain are working well together and sharing information efficiently. This ability is observed when the child transfers objects from one hand to the other and as they skip, gallop, play rhythm games, jump and ride the horse. When this coordination appears, the child can control objects of various sizes, weights, shapes and textures and use fine motor control. The focus in the therapy is on improving sensory-motor and perceptual development. D) Left/right discernment and spatial integration is how a person perceives the relationship of external space to his body as well how he perceives objects in space relative to others. Using the horse's movement, it is easier to learn to become aware of the body and distance. E) Motor planning is the ability of the brain to conceive of, organize and carry out a sequence of unfamiliar actions. Through hippotherapy, the child's motor planning is developed to guide and move the horse; a rider learns to train the muscles to carry out the task at hand. F) Perception of movement refers to the processing of vestibular information in the brain. Thus children working in activities and having different movement experiences, for example, riding the horse and using the natural gaits of the animal, the walk, the trot and the canter or slow gallop, have more opportunities to process movement information in the brain. G) Perception of touch; the tactile system

involves the interpretation of protective and discriminative information. Many aspects of social and emotional development are affected when a child has problems in integrating these two systems. Activities such as patting, brushing or touching the horses or different materials and textures help increase this ability. H) Ocular control is smooth, coordinated eye movement to focus on and follow objects. When the instructor guides the child, he learns to guide his eyes toward him. The same process occurs when he holds objects and the reins. I) Hand-eye coordination; there are many exercises that can improve hand eye–coordination during hippotherapy, for example holding the reins and making movements to turn the horse (Delius, 1998).

3.5.4. Physical benefits

Hippotherapy improves muscle symmetry (Benda, McGibbon, Grant & Davis 2003), balance, muscle strength and range of motion of joints, which may lead to improved co-ordination (Biery & Kauffman, 1989; Pesce, 2002). Bertoti (1988:1510) indicated statistically significant improvements in posture, while he was observing and evaluating the children's self confidence, muscle tone, weight bearing and sitting balance (MacKinnon Noh, Laliberte, Lariviere, & Allen, 1995). Other authors, such as Mc Gibbon, Andrade, Widener, and Cintas (1998) evaluated the effects of an 8-week program of hippotherapy in children with spastic cerebral palsy. They suggested that hippotherapy may improve energy expenditure during walking and gross motor functions in children with cerebral palsy. In 2004, a group of researchers in Ohio, in the U.S., replicated this study to determine whether hippotherapy had effects on the general functional development of smaller children (mean around 4 years) with cerebral palsy. They found hippotherapy to have positive effects on the functional motor performance and to be a good instrument in early intervention with small children. Naomy Scott (2005) explains that the most measurable effects from the way a horse's motion moves the body include: greater strength and agility, improved balance and posture, weight-bearing ability, improved circulation, respiration, and metabolism. A bareback pad is often used, especially for

hippotherapy, allowing the rider to absorb more warmth and massaging motion from the horse than he would in a heavy leather saddle.

3.5.5. Educational benefits

Building a good educational base for the child is very important, and hippotherapy may aid the student's ability to learn (Maculey & Gutierrez, 2004). There are diverse activities ready to be used in the therapy for enhancing personal growth and development, for example: A) Reading is a basic skill for daily life, and the different games and activities in the therapy can improve their capacity to learn, for instance, learning to recognize the difference in shapes, sizes and colours. B) Improving math skills is also possible with hippotherapy. For example, the child can learn to count the horse's footsteps, the horse's body parts and objects around the arena and addition and subtraction can be taught through games involving throwing a numbered foam die and subtracting the numbers (Fischbach, 2002). American authors such as John Rusti Miller and Antoine J Alston (2004) have studied hippotherapy as an educational tool for children with disabilities. They used interviews with parents to relate the improvement in their children's life to hippotherapy. They reported that parents indicated strong improvement in their children's social and academic development, particularly in personal responsibility.

3.6. HIPPOTHERAPY IN SPAIN

At the present time, hippotherapy is not a widespread activity in our country. There are few professionals working with this therapy and fewer places where it is available. In other countries, such as Belgium and France, the therapy is fully integrated in the society. In rehabilitation centres there is a school where the physiotherapist has horses available to him. In Spain, it is still considered an elitist sport to which not many people have access, and the majority of those who do see people with special needs as negative stereotypes. There are only three horse-riding schools in Spain which have agreements with universities. The oldest was signed in

1998 in Madrid, another one was recently signed in Catalonia, and our centre, which is the only one in Andalusia.

3.7. THE PURPOSE OF THIS STUDY

To sum up some of the main points described above, children with atypical syndromes due to the chronic nature of their illness need holistic early intervention programs. Specifically, recent investigation using hippotherapy concluded that it could be an effective therapeutic strategy for improving functional outcomes especially for children with cerebral palsy (Sterba, Rogers, France & Vokes, 2002; Benda, McGibbon, Grant & Davis, 2003; Casadi & Larsen, et al. 2005). There is no doubt that rare diseases are highly bio-psychologically complex, and in terms of inclusion, these children can benefit from hippotherapy programs. Results and data found about the benefits in children with similar diagnoses are poor in content and design, and need to be replicated. This is even more so in studies exploring the repercussion in children with rare atypical disorders.

The research contained in this Master's thesis collects the current knowledge about early intervention, including hippotherapy, in an attempt to improve explanations and explore the effects the therapy could have in such children's development. I will therefore attempt to answer the following questions:

- What is hippotherapy and how is it implemented?
- How do the therapists implement individual intervention using hippotherapy?
- What is the cognitive and motor condition of this group of children before and during the therapy?

I believe that the use of theory to document propositions is crucial to their reliability and validity. Yin (1994, 2003) elaborates on this idea as an alternative to hypothesis and as directing attention to something that should be examined within the scope of

the study. Below are the general propositions based directly on the effects of the therapy in the group of children who are studied in this thesis.

- Proposition A: The children's language and communication skills improve with the therapy
- Supporting theory for Proposition A: The use of animals in therapy creates a communicative situation
- Proposition B: Children receive social benefits from the therapist, horses and environment.
- Supporting theory for Proposition B: Children can learn values and attitudes through their interaction with the animal (catalyst for social and verbal interaction in children with special learning needs), which can then be applied at different levels (relationships with peers, therapist and outside the therapy setting).
- Proposition C: Hippotherapy as early intervention helps increase and develop the child's cognitive mechanisms, such as memory and attention.
- Supporting theory for Proposition C: Theory of neuronal group selection. New sets of experiences in the hippotherapy activities, (early intervention) create a unique pattern of neuronal connections. Starting in infancy, experience acts upon this pattern, modifying it by selectively strengthening or weakening connections between neuronal groups, or creating entirely new connections. These maps (brain connections) are dynamic in that they are continually redrawn according to our perceptions.
- Proposition D: Children's energy expenditure during walking and gross motor functions improves
- Supporting theory for Proposition D: The swinging rhythm of the horse's multidimensional movements is transferred to the child's pelvis in a manner that duplicates the normal human gait.
- Preposition E: Children feel relaxed with a feeling of peace and quiet after or during the therapy.
- Supporting theory for Proposition E: The temperature of the horse's body is higher than the human body temperature, increasing plasticity and relaxation.
- Proposition F: Hippotherapy enhances the child's development.
- Supporting theory for Proposition F: Theory of sensory integration: the basic sensory and motor components of the therapy influence the child's learning and behaviour.

3.8. SUMMARY

This chapter provides a theoretical overview of the history and definition of hippotherapy. The literature review is structured in five main areas relevant in this study and considered in the analysis of each case study.

The situation of the therapy and how the therapy is applied in Spain are also explained. The chapter concludes with an explanation of the purpose of the study and the main questions for research. The next chapter will examine the research methodology to be implemented in the three case studies described in the thesis.

CHAPTER 4 METHODOLOGY

The purpose of this chapter is to introduce the methods used in this study. It describes the design, population including the selection of the participants, research methods, research instruments and data collection procedures used. It also describes and explains hippotherapy as a holistic early intervention therapy used for children diagnosed with rare congenital disorders.

4.1. RESEARCH DESIGN

The study focuses on several exploratory case studies describing results of individual intervention with hippotherapy. The goal of this thesis is to investigate hippotherapy as a phenomenon using the four case studies as a unit of analysis. The focus of the four case studies is the principle that the individual circumstances and psychological characteristics of each child in my group are different and it is important to describe and explain them.

4.1.1. Case study design

Many different data resources and analytical perspectives can be used for case studies, which are important to health-care research. Merriam (1998) described a qualitative case study as “an intensive, holistic description and analysis of a single instance, phenomenon or social unit.” Case studies have been in use since the earliest days of health care as a means of undertaking a holistic analysis of typical or of special people and communicating these interpretations to health-care practitioners in a manner that is meaningful to them. Guba and Lincols (1981) concluded that case study is the best form of evaluation, because it provides descriptions that are well thought out, grounded, holistic and lifelike, simplifies data to be consider by the reader, illuminates meanings and can communicate tacit knowledge. In this study, the focus is on describing, interpreting and explaining participant experiences, and on how and why the intervention succeeds or fails, where the general context influences

the outcome, and where the researcher asking the questions has no control over events. The children described are enrolled in several short therapies offered by the city council's early intervention programme. For example, some children have physiotherapy sessions once a month in addition to hippotherapy. As a result, the number of relevant variables is far greater than can be controlled, so experimental approaches are not appropriate (Keen & Packwood, 1995). Our intervention with hippotherapy depends for its success on the involvement of several different interest groups. Every group, child, parent and psychologists in our cases studies, has a different interpretation of events. These different views are best captured using qualitative methods in a case study design.

As health-care psychologists, we are interested in many questions concerning what it is like for the people involved in hippotherapy to experience the physical and psychological therapy episodes in their lives, and how to provide assistance to them. Most researchers now consider it preferable to accept that the meaning generated in an analysis of experiences will be a product of the perspectives of both researchers and participants. Then an important part of the analysis is acknowledging and explicitly reflecting on the influence of the researchers own perspectives on the interpretation of the subjective experiences of the others (Chamberlain, Camic & Yardley, 2004). This study can be classified as an explanatory case study involving descriptions and explanations. It may be said that little research has be done in the area of hippotherapy, and no formal study in Spain, and there is a need for documentation grounded in the verification and empirical monitoring of theories and ideas (Befring, 2004). In this study, each child has a specific intervention programme, and each is consider as a unique individual, and each of them, along with their families, makes up one case study.

4.1.2 Qualitative research

This study is qualitative research in that it helps us to understand and explain the meaning of hippotherapy with as little disruption from the natural setting as possible. Qualitative research is based on understanding the phenomenon of interest from the

participant's perspectives and sometimes refers to the emic, or insider's perspective. Another characteristic is that the researcher is the primary instrument for data collection and analysis. Researchers must be responsive to the context and adapt techniques to the circumstances considering the total context and participants. In short, this study used the phenomenological method and depending on the depth of the data observed in the natural setting, is either exploratory or descriptive. The actual orientation of the study is based on the therapy process and the main goal is to be applicable and empirical.

4.2. POPULATION AND SAMPLE

The population in this study is all the children with rare congenital disorders who have participated in hippotherapy sessions in Spain. The reason why I chose this particular hippotherapy centre is that there are only 3 in all of Spain. The hippotherapists at the centre, called the Indalian Centre of Equestrian Arts, have had several years of experience with children with rare disorders. And the difficulty in the other two centres, in addition to their accessibility and getting permission to enter them, is my university agreement, which is only for study at the Indalian Centre.

4.2.1. Sample

I have designed the sampling method using some criteria I had developed previously in order to get a sample appropriate to my purpose. The four children in the sample were the main informants in my study (children diagnosed by Angelman syndrome, Robertsonian translocation, non-balanced translocation and global developmental disability).

However, in addition to this, for more complete information, the triangulation technique was adapted to our informants and information was also obtained from their parents and psychologists, for a total of 16 informants. As the study is qualitative, sample selection is non-random, purposeful, and small. Purposeful

sampling is based on the assumption that the investigator wants to discover, understand, and gain insight, and therefore, must select a sample from which the most can be learned, in other words, information-rich cases for in-depth study (Merriam, 1998). Due to imposed limitations on length and the quality of the text, at the time of writing only half of the data collected can be presented. I therefore present only two case histories using 8 main informants to demonstrate the holistic therapy model that I consider fundamental to my thesis.

4.2.2. Sampling criteria for children

The sample in this study consists of two children diagnosed with rare congenital disorders who are the focus of evaluation. The children all live in a large region in the south of Spain called Andalusia. The Andalusian Government grants direct attention programmes to children with high-risk developmental delays. The problems encountered with these specific programmes by parents are that they are transitory, and parents may not be informed, oriented or given family support. In this situation, Almería University finances early intervention programmes, rehabilitation, and speech therapy aimed at promoting the developmental capacity and personal autonomy of children form 0 to 6 years. One of these programmes is hippotherapy, and in 2006, offered a special individualized programme for children with rare congenital disorders.

Unfavourable conditions for riding, such as fragile bones, haemophilia, haemorrhoids, bad experience with horses or uncontrolled epilepsy influenced our criteria for subjecting some children to the therapeutic sessions, and no such children participated. Neither the sex nor socio-economic class of the participants were influential in our sample selection decision.

Participants had to meet the following criteria for inclusion in the final sample:

A) The two children selected to receive the therapy as an early intervention programme had to be from two to six years old B) The group of children is defined

by intense behavioural delay C) Geographic accessibility to the place where hippotherapy sessions were to be held.

The sample is composed of two children identified at an early age as having special needs by primary medical evaluation. They had been diagnosed with congenital disorders, Robertsonian translocation and unbalanced translocation (partial trisomy 11 and monosomy 4). One child was two years old and the other one was five years old when we held the first evaluation meeting in September 2006 and had been cared for in parallel by community health-care services from birth. I selected the youngest and the older child of the four case stories, to get more variability on the data presentation.

4.2.3. Sampling criteria for parents

In general, the parents have been searching for a precise diagnosis and the most adequate intervention possible for their children, and that is, individualized therapy limited to a single child. The parents were open, eager to take the initiative, and were strongly motivated to participate in the therapy.

4.2.4. Sampling criteria for hippotherapist

The four hippotherapists have a background in clinical and developmental psychology and have broad experience working with hippotherapy techniques with children with rare disorders.

4.3. INSTRUMENTS

The data collection instruments used for this study were a combination of several methods: three types of developmental observation scales and interviews. In our case studies we use triangulation to ensure the validity of findings. In triangulation, all data items are corroborated by at least one other source and normally by another method of data collection (Keen & Packwood, 1995). Data were collected from the

children by observation and collected from parents and psychologists using semi-structured interviews.

3.3.1. Developmental observation Scales

The Battelle and Portage observational and developmental scales used for this study were selected by the Neuroscience Department for evaluation of children with similar characteristics. Tools have three administration formats: structured administration, observation, and interviews with parents. Three days' training was given the hippotherapists and me by the CERNEP therapist. The training focused on the demonstration of the scales and information collection.

We decided to use observation as the main instrument and see if the child performs the activities, but when he refused to do them during the administration procedure, we asked the child's parents. It took approximately 2 2-hour sessions to give each child all the tests. The CERNEP psychologist, the hippotherapists and I met with the parents and children in September 2006. The team decided which one of the four hippotherapist would care specifically for which child. We preferred that the psychologist and family relations continue throughout the therapy period. Each personal hippotherapist, along with the CERNEP psychologist and me, evaluated each child in a quiet room in the CERNEP Centre. To avoid the children's being afraid in the assessment environment, we tried to use a positive, gradual, low-demand approach to allow them to adjust to the new situation. During the sessions, the children were accompanied by their mothers and brothers/sisters. Although we tried to get the company of both parents, the fathers usually went to the hippotherapy, but not to the assessment sessions. During the first few minutes in the sessions, we talked to the parents while allowing the child to explore the room freely and leaving him enough time for this reassurance to occur normally. We also encouraged the child to play with the assessment material to decrease a reaction to failure in new activities. To maintain the child's interest, we interspersed the items and altered their order

(Bagnato & Neisworth, 1991). To discover whether the child had acquired a particular skill or behaviour, it was important for us to repeat the task at a later time, observing spontaneous-play behaviour. Authors, such as Marshall and Rossman (1989) have defined observation as a systematic description of events, behaviours and artefacts in the social setting under study. We try to understand the world better, usually from the starting point of individual participants. This is true here, where we were with, and had personal experience with, all the therapy participants. The focus of the observation was on acquiring the richest information possible from our participants (Gall, Gall & Borg, 2003). This method can tell us not only what is going on, but also who is involved, when and where things happen. It can provide access to phenomena that are often obscured, as for example, children with nonverbal cues. The observation lasted almost my entire stay in Spain, so it is the method I used most intensively during the time I was working at the therapeutic centre. Observation defined as a research tool then serves to formulate research goals, such as evaluating children's behaviour. Observation was the most important part of the research used after a detailed examination of documents (clinical histories of the children and theoretical review of childhood diseases) and evaluating the development scale results. We used the two scales for the purpose of creating the observation scales defined below. These are the two scales used:

4.3.1.1. Portage assessment scale (White & Cameron, 1987)

This tool is an observation and planning scale published in 1972 by Bluma and Co. (an American Portage Project initiative), published in Spanish for the first time in 1978 after review in 20 countries. The CERNEP psychologist and I used the 1987 edition to evaluate the two children in this study. The programme has seemingly had universal appeal. It has been translated into approximately 30 languages and used in more than 60 countries (Brue & Oakland, 2001). The information gathered through systematic observation is used for individualized curriculum planning. The tool is designed to assess children, set teaching objectives and carry out individualized activities in five areas: infant stimulation, motor, social cognitive and language skills,

and has a total of 580 items (Portage project, 2005). The guidelines can be use for normal children or children with special needs to determine their developmental level and make programmes/plans. We adapted the guideline's goals and activities. Guideline supporting material includes the Portage Checklists and Teaching Cards. The developmental checklist is used to identify the child's repertoire of existing skills in the five areas. Skills are listed sequentially under each heading describing behaviour the child has acquired from birth to six years. A general section called "infant stimulation", covering the first six months of life, precedes these five sequences. Parents fill in the details of behaviour that the child has already learned on the checklists, and this information is useful to build on for future teaching. The Portage Teaching Cards provide specific teaching instructions for each of the 600 or so items in the Portage Checklist. These cards have two main functions, providing useful teaching hints and giving suggestions on different ways of teaching the same skill, thus enabling the child to generalize and adapt the skills taught (Cameron, 1997).Several authors (Barna et al, 1980; Blidder, Hewitt & Gray 1982; Dessent & Ferguson , 1984) have commented on the value of the Portage Scale as an intervention method appropriate to the needs of severely disabled children.

4.3.1.2. Battelle Developmental Inventory Screening Test, second edition BDI-2 (Jean Newborg, 2004)

The Battelle Test is a standardized, individually administered assessment battery. The scale is applied for children from 0 to 8 years old. It evaluates the development of children's basic skills in traditional areas and offers a developmental level. It comprises a total of 341 items, grouped in the areas corresponding to personal and social, adaptive, mobility, communication, and cognitive skills. Following are descriptions of the five domains: 1)The personal-social domain concentrates on the child's ability to engage in meaningful social interaction with adults, his ability to express emotions such as affection and anger, development of self-awareness and personal knowledge, quality of interaction with other children, ability to deal with the environment and social-interpersonal development. 2) The adaptive domain related to

self-help skills and task-related skills. 3) The motor domain assesses gross and fine motor development. 4) The communication domain assesses receptive and expressive communication skills. 5) The cognitive domain assesses the conceptual skills (Sattler, 2002).

The items are arranged in order of increasing difficulty, grouped in 6-month increments from birth to 2 years and in one-year increments from 2 to 8 years. The scale may be used by a team of professionals or by an individual service provider. The BDI-2 can be administered to children with various handicapping conditions by using stated modifications, as noted when the child uses non-language communication and mimicry to express himself. Evaluation takes approximately two hours in two sessions per child. The mothers were always there to give us information about the items difficult to observe in the evaluation setting. The inventory can be administered to find a child's baseline level, but as the inventory was used to orient our activities in hippotherapy, we were not interested in those scores. The point in using this scale was to get information about which activities the children were able to do and what would be the next step in their development.

Authors who scientifically analysed version one of this scale (Glascoe & Byrne, 1993., Tyner & McEwen, 1999), concluded that, the scale appears to be a good discriminative measure to determine children's eligibility for early intervention programme services based on developmental delay.

4.3.1.3. Hippotherapy observational scale (HOS)

This scale was specially planned by the hippotherapy team, the psychologist and me, and recorded specifically for this research. My main tools of analysis were the hippotherapy team's clinical notes on review of the children, interviews with parents and psychologist and developmental scales (Battelle and Portage). With these tools, we planned how to get appropriate information to create our behaviour observation list and a specially designed intervention programme was drawn up following the five areas of the Portage Scale. Results obtained in the first-level analysis were used to

design two subscales corresponding to the potential capacities of the children related to their health. The scales were child centred. Data collected relate to measurable changes in the child's behaviour.

HOS-1 is composed of 50 items (Appendix 5) and is useful for collecting information about early intervention, communication and socialization, attention, motricity, cognition and relaxation. HOS-2 is composed of 55 items (Appendix 6), and is used to gather information on communication and socialization, attention, memory, motricity, cognition and relaxation.

The general paradigm for the single-case design involves first collecting data about the target problem based on child behaviour. We designed a coding scheme for each child based on the characteristics and deficit revealed by the appropriate test in each of the five areas (early intervention, socialization, language and comunication, cognition and motricity) and considering the specific variables that the hippotherapy team would attempt to modify in the child through the therapy.

The scales are flexible and can be easily modified, and can be used both as guideline for the session activities and for instructional strategies, in the light of the child's rate of development as assessed by the scale and the psychologist's ability to implement the programme. In addition, intra-individual differences can be accommodated. The child's progress determines the variety, quantity and difficulty of the activities. Each step in learning that the child takes must be recorded, as well as who was carrying out the activity, the conditions under which the child's behaviour took place and the degree of success (for example 3/8 times). The analyses of nonverbal cues, such as facial expressions or body contact, are very important in the observation of the children, because none of them can talk.

4.3.2. Interviews

Some points are used to differentiate sample conversations from our interviews: the assignment of different roles of parents and interviewers resulting in an asymmetric relationship; we assume that the interviewer controlled the situation (not excessively)

and that the interactive nature of this tool can be used for motivation as well as for gathering therapeutic information. From the first meeting we tried to establish a positive relationship with the families, and contribute to dynamic bidirectional communication.

We consider some advantages in using interviews described by Zaldivar (1999) as a collecting tool: A) The interpersonal relationship facilitated during the interviews enabled the parents to listen to the psychologist, which gives an important empathic, emotional and therapeutic value to the relationship. B) It provided idiosyncratic information on the parent's history of interaction with their children, and about the significance that certain facts and past actions have for the subjects as parents. C) Nonverbal communication can be observed. D) The enormous flexibility of the interviews makes them very useful for numerous purposes, such as clinical, diagnostic, etc.

Our interviews were mainly used to retrieve information about subjective meanings of the children's parents, to assess information about their children, and to find out their opinion about the therapy. The co-researchers involved and I had previously had several meetings to discuss the questions to be asked beforehand, making the way these questions might be tackled explicit, and addressing the topic and the task of the interviews. In the first instance we interviewed the parents to complement the information from the developmental scales and to clarify each item. As important information resources, parents relate in as much detail as possible experiences with their children that we can use to compare with the observation data. The interviews were given in 4 two-hour sessions, combining two different types, structured interviews to get the basic information from the family and semi-structured interviews guided by a set of questions and issues to be explored. We always took note of the information acquired during the interview while the parents were speaking. We asked the parents to describe their understanding of the situation and explore precisely those areas where they thought there was something important to them that they wanted to say and share with the therapists. It was also helpful to have

a list of topics, with a list of subjects we wanted to cover. The use of observation and interviews with the adults caring for the children can be an effective instrument for acquiring more in-depth detailed information on each child.

The semi-structured interview schedule used consisted of 3 questions for the parents and psychologists working with the therapy. We preferred semi-structured interviewing because the participants can include information that may not have been anticipated and hence the approach can empower disadvantaged groups by validating and publishing their views (Banister, Burman, Parker, Taylor & Tindall, 1994).

The questions were developed from a review of related literature concerning hippotherapy:

-As a result of the hippotherapy, have you noticed any change in the child's performance in school and at home (different settings)?

-What types of barriers, if any, do you see in this type of therapy?

-Would you recommend hippotherapy to other parents with children with disabilities?

Insofar as the disadvantages of interviewing, the validity of the information retrieved from the parents may be uncertain, however, we attempted to minimize this drawback by using the other tool, observation of the children

4.4. PROCEDURE

The procedure requires an exact description of the entire intervention, as the more exact the description and the more in detail the treatment can be described, and the more the therapist follows the rules set out in the treatment plan, the higher the level of treatment integrity is (Petermann & Müller, 2001). The data collection involved field work. I was with the people in their setting for four months (from August to December) in order to observe their behaviour in their natural surroundings acquiring rich descriptions and interviewing as a complementary instrument. Following

collection, the data were organised in a systematic manner for their analysis and conclusions in Norway.

4.4.1 Selection of the hippotherapy centre and professional team

The research study was conducted on the premises of the Neuroscience Evaluation Centre at the University of Almería, Spain. My local advisor was the Director of the Neuroscience Department and the Head of the Hippotherapy Programme, so the University had permission to do research in the Indalian Equestrian Centre in Almería, and with the support of the CERNEP Centre.

4.4.2 Selecting the families

During the summer of 2006, the families contacted the Almería University Department of Neuroscience, which made appointments for them at the CERNEP Centre. The senior CERNEP psychologist and I interviewed the parents and the children, and decided to start the hippotherapy programme in September. During the first meeting we informed the parents about what would happen during the study and the therapy and they gave their consent. Parents received an explanation of the scales and procedures used. The explanation given was accompanied by information about the potential benefits of hippotherapy for their children and the free services given by Almeria University. We added that the parents proposed that they participate, and that the idea of their participating in the thesis was based on helping families or therapists with children in the same situation through the use of hippotherapy. The letter of consent describing the research was submitted to the parents who agreed to participate (Gall, Gall & Borg, 2003).

4.4.3. Data Collection

Research for the thesis was designed on two related levels and sequenced to explore the goals described (See Table 2).

The first level involves a transversal descriptive study that analyses the children's clinical history, observations of children related to items from the Observation

Development Scales (Battelle and Portage Guide to Early Intervention) and interviews with the mothers to complete the data observed.

The second level of analysis, involves a 4-month longitudinal descriptive and exploratory design. The purpose of this design was to detect the changes in each child from the baseline evaluation.

TABLE 2. General diagram of the study sequence and different levels of analysis

First level analysis/ baseline (2 months):

- Literature review: theoretical knowledge base through study of the literature and consultation with experts (clinical units) /USED TO DESCRIBE CHILDREN / POTENCIALS
- Structured interviews with mothers
- Observational scales (Battelle and Portage)

Second level analysis: Part of the longitudinal study :

- Monitoring for four months
- Hippotherapy Observational Scale. (HOS)
- Semi-structured interviews with parents and psychologists

4.4.4. First level: Evaluation of the children before the hippotherapy sessions

The main purpose of this first level of my study was to find out the baseline with regard to the specific capacities related to the study. It can be defined as controlled practice attempting to describe and document the therapeutic process with the aid of the single-case methodology in a relevant, practical manner. The clinical problems are clearly defined by psychological case evaluation and treatment plans (Petermann & Müller, 2001). Psychological evaluation is defined by Zaldivar (1999) as a process of exploring and measuring behaviour that always involves information collection for a defined purpose. My reasons for using “psychological evaluation” in this thesis are

to classify and diagnose the children, and classify the children in diagnostic categories to adapt specific hippotherapy exercises to them. In this process, the parents' goals were to formulate goals and hopes directly related to their children's treatments, record the changes and evaluate the outcomes. We agreed to meet the parents for psychological evaluation during the month of September. From the first stage of this study, I tried to hold group meetings with all of the therapy team (CERNEP psychologist, university neuro-developmental professor, university physiotherapist and four hippotherapy-psychologists) once a week to share opinions. The psychologists oriented the two families in how to help their children in their daily lives and apply similar exercises at home for the purpose of generalizing them to the children's activities. Hippotherapy would be used as a treatment to change some problem behaviour in the two children and their parents. Then I decided to separate the two children as independent analysis units, and related each case to the entire proposition. We thought that to understand the real competence of the children in their family-social environment better, we had to extend our research by searching for additional information in child developmental organization, described as communicative abilities, social-emotional development, cognitive processes and play skills. We also decided to have progress meetings with each child and parent one hour every week until the therapy ended. The medical history and release forms for each child were submitted at the first session. After review of the medical history, the team decided whether the child would be a candidate for hippotherapy. Later we planned the children's evaluation using the development scales (Battelle and Portage Guide to Early Intervention) their clinical histories as described above under participant description(See Appendices 1 and 3). And the last stage, although not the least important, was evaluating the family and social environment and the child's environmental connections using the family interviews that we described as observation tasks. We consider the term monitoring as the use of different methods to record the entire therapeutic process.

4.4.5. Second level: Evaluation of children during hippotherapy sessions

The second level of the study began in October when the hippotherapy sessions started and the hippotherapy team (CERNEP psychologist, four psychologists from hippotherapy centre and me) continued to record the information from contacts with the parents and children. With all of the information from the interviews with the mothers and data collection had been compiled, the goals and activities were adapted accordingly. I structured the observation guides used in the therapy sessions, AOS-1 and AOS-2 (See Appendices 5 and 6). Each item in the guideline described, from general to more specific, those points that the therapist must work on with the two children. We decided how likely we would need to consider the amount of information that we could extract from the observations, and what precisely the analyses would be. We met as a team to define the important points to be observed and the real points of interest in each child. The checklists used can be defined as progressive scales of behaviour, and were accompanied by examples of activities that could enhance the children's behaviour (See Appendices 2 and 4). The four hippotherapists had three types of information for each task that they would be working on with the children: The long-term teaching objective, or "target behaviour", information about what the child can do at the moment (learner's skill level), easy target which the child can do in short time and a sequence of steps to fill the gap between what he can do and what he does. The idea was based on the Vygotsky (1978) idea of zone of proximal development. The author argues that educational and special needs assessment must be extended to analysing the pupil's potential for learning and development. It is the distance between the actual developmental level as determined by independent problem solving and the level of potential development as determined through problem solving under adult guidance or in collaboration with more capable peers. The long-term teaching objectives were defined by a professional team composed of the CERNEP psychologist, two hippotherapist, physiotherapist and me and were described as examples of exercises and were part of the information of each personalized check list. The team prepared the exercises by areas, for example, the physiotherapist worked on designing the

mobility exercises, the CERNEP psychologist on infant stimulation and cognition exercises and the others on socialization and language, but we shared our opinions and created the final scale together. I also consider the role of the parents as partners. During the therapy, I met with them to find out how they felt about their child's therapy. We placed strong emphasis on family participation in hippotherapy to apply all that their children learn in the family context. In December, I left Almería to continue my studies in Oslo, but the CERNEP psychologist continues having one session per week with the parents. Meetings with parents were oriented toward helping them clarify the problems or events facing them so that they could set goals, plan how to meet the goals and carry out any action necessary. Any interaction with the parents is an opportunity to support family-professional collaboration. The group had had experience recording behaviour, and were systematic observers and experienced field researchers. In order to report accurately we decided to be very attentive, alert and perceptive to the children's behaviour and take notes of the behaviour observed in the scales (Sattler, 1992).

My role in the group can be defined as "active member", as I was involved in the setting's central activities, assuming responsibilities as a psychologist, but not fully committing myself to member values and goals (it is not personally important to me whether the therapy works). My activities were known to the entire group (Psychologist, children and parents) and my participation was secondary to the role of information gatherer (Merriam, 1998).

The parents' contribution was very important throughout the process, and when we met them once a week we tried to involve them as partners who would continue teaching the children at home. The home activities were planned to be done in no more than 30 minutes a day. Most of the activities were part of their daily life, for example, listening to the names of objects when they used them or listening to the names of body parts while dressing (White & Cameron, 1987).

Our relationship with the parents was based on the six skills described by Beckman, Frank and Newcomb (1996): We tried to hit it off with the families (non-judgemental

attitude and empathy), use active listening, ask efficient questions, make concise reflections on the parents comments, provide information to the parents and positively redefine the problems they face.

For a holistic therapy, knowing the experiences of the parents and psychologist is of major importance, and in February I called them to get information about their positive and negative views of hippotherapy for the group of children. The interviews were tape recorded and transcribed. The codes were made according to certain main points based on the grounded theory.

4.5. ETHICAL CONSIDERATIONS

We arrived at an agreement with the parents to make selected data public and thereby make a scientific contribution. We assured them of our intentions to guarantee and respect all ethical procedures. In the writing of this thesis I have tried to respect the rights, dignity and sensitivity of the families and our research population and also the institution where the therapy was given. They have the right to withdraw from the research at any time (Gall, Gall & Borg, 2003).

4.6. VALIDITY AND RELIABILITY OF THE STUDY

Four logical tests of empirical research design are used to judge its quality. The tactics used for this in this study are:

The construct validity is checked by using multiple sources of evidence, such as previous documentation about the children, observation and interviews with parents and psychologists and establishing a the most descriptive chain of evidence possible (related circumstances, sufficient references related to the main subjects which are the content of the study).

Ecological validity in this study should be increased either by ensuring that as many variables as are present in the real world are present in the research setting or restricting the variables that are relevant to our study. We attempted to make the setting as much like the real world as possible. The psychological behaviour indicators that we try to measure in each child are relatively ambiguous and unstable and the data obtained depended on the person measuring and varied from situation to situation. To maintain reliability, team measurements were made during long periods, several times, and by different professionals (two hippotherapists for each child and me) in the same situation. This principle of measurement is called the Befring (2004) assessment, or scoring reliability.

4.7. STUDY LIMITATIONS

It is important to notice the small sample size used in the study, and we found that certain distinctive features in the data can make it difficult to avoid identifying individuals in a report, compromising anonymity. We determined that confidentiality is essential to protect research participants, asking, for example, the group of physiotherapists to furnish information anonymously and using an alias for each participant. We consider the vulnerability of this group accentuated by the methodology, which involves intensive study of a small number of cases over a considerable length of time, and we try to decrease the effect by working with trained and responsible professionals.

The external validity of this design can usually be tested by replication, and so our study is going to be continued in a long-term therapy (Dunn, Smith & Montoya, 2006). Gall, Gall and Borg (2003) defined the target population as all the members of a real or hypothetical set of people, events or objects to which the researcher wishes to generalize the results of his research. These two Spanish children can be representative of the target population of children with special needs participating in a hippotherapy programme. The purpose of a random study is usually not to focus on

generalization and not to represent the population, but we think that in our circumstances, we can generalize because there are only three centres in all of Spain, and there are only a few children in each course. There is an issue with regard to generalization of case studies, and I would like to add the term "reader/user generalizability" created by Sandra Wilson (1979). This term places responsibility on the reader or user of case study research for determining the applicability of the findings to their own situation. In this case, I will try to provide a description of the participants and the context that comprise the case and the reader can decide how similar it is to their situation of interest. Therefore, external validity may be a problem, as the result can be very subjective, especially for research, because there is always the possibility that the observer may have been influenced in some way by the situation (Banister, Burman, Parker, Taylor & Tindall, 1994).

4.8. CONCLUSION

This chapter describes the qualitative design of research in two case studies. For the qualitative study, instrument design included triangulation and choice of informants. Data was collected from interviews, but observation was the main instrument. The professional team of psychologists and a physiotherapist and I developed individual scales for each child based on several different validated scales. Validity, reliability and ethical measures were taken into consideration. The data were analysed and coded, and then grouped in categories. These categories were grouped in two parts and are described in the following chapter.

CHAPTER 5 DATA PRESENTATION

This chapter draws the reader's attention to an analysis of the findings based on the qualitative data gathered during the research. The data presentation is related to the results of the different instruments.

5.1. FIRST LEVEL RESULTS

The first part of the study aimed at investigating the global development of the two children before the hippotherapy sessions began. This concerns the presentation and discussion of findings of observational scales and interviews. The Spanish Health-Care Services had found the children to have global developmental delays when they were born by routine cytogenetic studies, newborn screening and some routine neuroimaging (MRI or CT). We received exhaustive information on each child and researched each syndrome or syndromes with similar diagnoses or characteristics in the literature. Literature searches were conducted with the assistance of the Neuroscience Department of Almería University and the Norwegian Directorate for Health and Social Affairs Genetics Counsellor who provided relevant articles published from 1986 to 2006. Searches were restricted to the English and Spanish languages under the subheading Children. The analysis of this documentation was used to find the children's potentialities. We used this information and the children's medical history to prepare our intervention plans and to analyse and complete the information from the mothers' interviews and the evaluative scales. Several schemas are used in presenting first-level results from the data retrieved using the Portage and Battelle guide. A table summarizes data related to the main features assessed in the children. There are nearly 1000 items on the two scales, and naturally, not all were used to plan the hippotherapy exercises. The CERNEP psychologist and I decided to ignore those items that are inherently impossible to assess in the therapeutic setting, such as those related to diet, clothing and self-help. Data from the Portage assessment shows the abilities developed by each child from birth to evaluation (September

2006). The information was acquired from interviews with the mothers and clinical observations. The mothers reported when they remembered observing the abilities and situations related to their child's behaviour. The age on the left of the table is chronological. Data from the Battelle scale show the child's abilities at the time I evaluated them (September 2006). The information was obtained from interviews with their mothers and clinical observations during four sessions in one month. The months described in the tables are based on the Battelle criteria for describing children's developmental age. The scale considers the normal developmental abilities in the children by months. But the main point is to know what the child can do to plan exercises at approximately the next level in normal progress as defined by the scale. For example, if the child can vocalize sounds, he may soon be able to express his feelings with different sounds. Development is not always linear, however, we believe that in these children, it will be progressive, if their environmental conditions are positive. As mentioned above, we designed the instructional hippotherapy exercises in two groups, one for the younger children and the other for the older children. As a conclusion of the evaluation of the first part, we summarize the children's development and improvement with the hippotherapy exercises.

5.1.1. Data from the evaluation of the child diagnosed with robertsonian translocation, 45, XY, T (13Q, 14 P)

This part of the chapter describes the child diagnosed with robertsonian translocation, the first research subject, in a rich descriptive narrative.

5.1.1.1. Child's history

The child was born in 2001 and was admitted to the intensive care unit where he remained for 15 days for some mild dimorphic features and chronic encephalopathy caused by a maternal uniparental disomy for chromosome 13 and 14. Diagnosed in the hospital with clinical sepsis, functional heart murmur and motor developmental delays. After birth hypotonia was observed, with poor sucking, for which gavage feeding was required. At 10 months of age he was able to change spontaneously

from ulnar position to sitting and to sit alone steadily. He takes objects and passes the objects from hand to hand. He shows no evidence of comprehensive language. He has moments of continual absorption and he wakes up only with external stimulus. The child showed stereotypical negative head movements. He was attentive only to visual stimuli, not auditory; absence of hand-eye coordination. He was able to sit and turn his back at 12 months. Care in the public health system was poor and the mother took him to a private centre in Murcia for consultation. They diagnosed a chronic non-progressive encephalopathy of chromosomal origin. They agreed to have the parents bring the child to physiotherapy 3 days a week and psychological therapy fortnightly. At 20 months, the child was reevaluated in the private centre, finding his reaction to stimulation improved, and more attentive than 5 months earlier. He was starting to walk with help. But the child continued to have problems chewing food and no comprehensive language. In 2004, the family went to Barcelona to try to and find a name for their child's problem, a clear diagnosis and were told it was hypoacusia and global developmental delay. The child is starting the babbling phase but has little intention of communicating. He continues going to the CERNEP psychologist and physiotherapy, after school hours.

5.1.1.2. Data from Portage and Battelle evaluations

The main areas assessed were socialisation, language, memory and attention, cognition and mobility. Assessment was done when the child was approximately 64 months of age. Information from the child's history helped us to recognize his progress and we could see his relative weaknesses, but these were positive, and there was no regression. According to the observations made with the scale data and the clinical evaluation, we decided to distinguish the children's potential for development in different areas. It was difficult for us to evaluate what he is able to do because of his aphasia. The mother helped us to complete the information by telling us about experiences at home.

It is important to consider the special circumstances of the child's family, which can affect the validity of the data. The mother in the first session refused to give us any

information about her child's development in early childhood. We therefore started to use the Battelle scale and record what the child can do by direct observation. During the next session she told us that she had felt bad when she looked at the items and saw how few things her child could do and she felt that she has forgotten the first year of the child's life because they were very hard for the family. So we decided to ask her only some directly relevant items and not the complete Portage scale. We think the mother needs to know the progress of her child and work with him on similar exercises at home to make her feel proud of his improvement.

As in the previous case study, the child's behaviour was evaluated by area:

Communication and language: when the child entered the therapy room, he was very quiet and looked at the floor when we tried to get near him. He was not attentive to the simple instructions from his mother. He smiled in the previous session and looked at us as familiar persons. He is able to ask for help if he needs it and there is strong interaction between his mother and him. There is a dependence relationship that can be positive and negative at the same time. She understands him perfectly by mimic and gestures, but at the same time, he is unable to express himself in a way understandable to others. The mother told us that he has a problem playing with other children and prefers to play alone. The therapy will focus on improving basic communication using basic words and gestures. His oral communication was delayed; he was able to repeat the names of his parents but only in extreme circumstances to get their attention. The family did not try to read books or sing to him at home. But he showed interest in the music and was able to mimic gestures. It is important to teach him to point to what he wants by anticipating him first. Because the mother told us that she never asks and he has not developed the ability to choose for himself. The social activities focus on basic skills, such as recognising his name, the body parts and pointing.

Cognition: The difficulty behind the ambiguous items on the scales gives us a negative perception of his cognitive abilities. It was really difficult to check the child's abilities in this area without enough time and the refusal of the mother to

answer questions about what the child was able to do. We plan to design attractive, fun exercises that take into account his abilities to give, take and search for familiar objects. At the same time, the teaching focus is on recognizing geometric shapes and matching objects by names, by touch, and later on by colours. We are interested in teaching the body parts and sizes (big and small) and directions (back, front, right and left) that can be used later to instruct the horse. Memory: he is able follow auditory and visual stimuli but for a short time period and he is able to recognise photos, music, family and friends. We planned to use different materials of different sizes and colours, preferably big balls, which are his favourites. Things are moved from one place to another for short periods to help him to search. We believe that the child needs to feel motivated to learn and remember new words, spaces and time tables. We also work with a missing object to increase his ability to search. Work sessions are planned as a routine, always going to the same places to help him remember what the next step is going to be. Attention: multi-sensorial activities and objects from the natural setting are used. We try to concentrate on one thing at a time and change the tone of voice of the instructor from soft to loud to help lengthen his attention span and make it fun for him. The voice is used to work with the child followed by gestures for the instructions for singing the “Indian song”. He had a very strong interest in objects, animals and music. The balls attract his attention and we consider using them as a way to get his attention. His attraction to animals makes therapy on a farm perfect for him.

Mobility: His coordination has been developing normally in the activities in the therapy room, but some that he has not practiced at home did not improve. His mother tells us that he did not play at home at turning somersaults, hopping and throwing or taking a ball with his hand, and she does not try to let him go up stairs alone. His fine mobility was not quite developed, perhaps because of lack of stimulation by the parents who did not place him in the situation. For example if he never had a book he is not going to be able to turn the pages. However, although the mother told us that he could not open a door, when we put the big ball in the other room, he went running to open the door and get it. Poor body coordination and

spastic movement make his locomotion difficult. He is able to walk and run, but feels tired and stops every few seconds to try to get picked up to rest.

5.1.2. Data from the evaluation of the child diagnosed with unbalanced translocation, partial trisomy 11 and monosomy 4.

This part of the chapter describes the child diagnosed with unbalanced translocation, the second research subject, in a rich descriptive narrative.

5.1.2.1. Child's history

The child was born in the Almería public hospital in 2004. The mother was a carrier of unbalanced chromosome translocation in pair 4 and 11. The foetus was diagnosed in amniocentesis during pregnancy, and undefined genitals were detected. The child's fontanel and glabella were open and tense, he has peculiar facies. His reflexes were normal. Several weeks later, when the child was one month old, the child was hospitalized for bloody stools and rectal prolepsis. The hospital did not evaluate the child and the mother took him to a private psychologist in 2006. The professionals at the private clinic described the child as having macrocephaly, hypertelorism, retromicrognathia, micropenis and bilateral cryptorchidism. The child receives clinical psychological therapy at the CERNEP, private physiotherapy at home, aquatherapy and kindergarten with special educators.

5.1.2.2. Data from Portage and Battelle evaluations:

The main areas evaluated were early stimulation, socialisation, language, memory and attention, cognition and mobility. Evaluation was done when the child was approximately 24 months of age.

The child's developmental assessment was complicated because the mother's answers were not related to the behaviour observed during the sessions. On several occasions she said that the child did more than he was able to according to his performance and stage of development, but we considered what she said. We experienced most of the items asked about during the evaluation period in person

during the different sessions. We tried to repeat each scale item at least twice, and we took four one-hour sessions to do so. The development is described by area:

Socialisation: In the affective area, he was able to show happiness when he saw his mother and made sounds of pleasure, he laughs, cries, and responds to strong stimuli. During the evaluation he cried very little, making soft sounds and opening his hands for protection. He could spend time playing alone and only called out to receive attention a few times during the sessions. When we said his mother's name, he stopped what he was doing to look at her, but did not answer to his name. His mother says that when he is with other children he smiles and laughs.

Language: The child makes and repeats his own sounds and when we put on music he liked to move his hands to both sides and repeat the rhythm of the song with his voice. He was starting to repeat sounds, for example, the letter 'm' and the mother said that he was able to say words with two syllables (like 'mama' and 'tita'/ aunt).

Cognition: The child followed auditory and visual stimulation for several seconds. He is able to imitate an action such as banging on the desk or a chair or shake a noisemaker. Memory: The child follows the additive stimulation but he was able to focalize on visual stimulation only for a few seconds. The mother says that he searches for an object when he has been working with it, and we gave him a musical pen with a bell which he loved and he was able to play with it for several seconds. A few minutes later we took it away and he looked around and cried to get it back. We tried with other objects without sounds, but he didn't respond the same way. Attention: He has an extremely short attention span of only a few seconds when you try to say something to him. He looks at his hands when he closes and opens it and he moves toward the place where the sounds are to listen to them. He is more fascinated by colours than by sounds. The mother tells us that he loves anything yellow or red.

Mobility: When he is annoyed, to keep the disturbances away, he makes short slow movements in both directions with his hands. When he is laid down on the mat, he does not try to crawl, and always adopts an asymmetric posture, which he does not

change except to cry out to his mother. His neck muscles are not developed well enough for adequate vertical head control. When he is helped to sit, he is able to turn his head to the left and right. He does not put things into his mouth and he did not physically explore his surroundings in the evaluation setting. He supports passive mobility only for a short time and has great difficulties in moving going anywhere.

He is a lethargic, quiet child and not interactive. His progress is very slow in almost all development aspects. His low marks on the scales may be influenced by excess weight or his large size. In general, he is characterised by serious developmental delay with hypotonia mainly in his arms and trunk.

5.1.3. Conclusion part one

This part describes the children as observed with the aid of the Portage and Battelle scales. Additional data was collected through observation during evaluation with artefacts collected during the research period. This information helped the team describe the exercises and the scales analysed in the next part of this chapter.

5.2 SECOND LEVEL RESULTS

The second part of this chapter presents the results of the analysis of the children's development during the hippotherapy sessions. In order to code observation of the main areas evaluated in these children during the therapy, I compiled the observation schedules in advance. First their global behaviour is described as recorded using the observational scales (HOS1/2) during the hippotherapy sessions; afterwards, the results of the behaviour recorded in each area on the scale, and specifically, frequent behaviour during the observation period is classified in specific categories.

The items on the scales are the result of the behaviour analysis described in the first level of analysis of this study and refer to the theoretical behaviour-potential that the children could develop during the hippotherapy sessions, as observed and recorded by the hippotherapists and myself. It should be mentioned that the children had two weeks of holidays between the sixth and seventh sessions. Therefore the short-memory exercises planned, could not be achieved because there was not enough time, and the relaxation exercises are considered a control observation.

First the information gathered in the interviews with the mothers is described, and finally the data report provided by the psychologists that participated in the hippotherapy sessions (see Table 3)

Table 3.- Informants who contributed to the second level of the study

INFORMANTS	
GROUP ONE	**GROUP TWO**
Child with Robertsonian translocation	Child with unbalanced translocation
Mother	Mother
Hippotherapists	Hippotherapists

The team of four hippotherapists and myself collected the information during four months of sessions (eleven sessions). The data tables were used to make the individual changes more visually accessible and descriptive. The content of each child's analysis was structured in categories by core skill development. The data is presented beginning with the main areas, classified as communication, language, cognition, memory, attention, motoricity and relaxation, plus early intervention for one of the children.

Second level data is for performance in the main areas during hippotherapy. As a qualitative study, we acquired a rich descriptive narrative, but as it was to extensive, the results are given in tables. We used the answers from the closed Yes or No questions, to simplify the results, and the items that the child was observed to do more than 50% of the time or are very relevant to his development are recorded in the tables. To acquire holistic information about the effects of treatment, we interviewed each child's psychologist and parents about their views of the therapy's effects on the child.

Table 4. -Questions answered by parents and hippotherapists

RESEARCH QUESTION A: As a result of the hippotherapy, have you noticed any change in the child's performance (different setting and during the therapy)?
RESEARCH QUESTION B: Did you notice any specific challenges related to hippotherapy?
RESEARCH QUESTION C: Do you feel that hippotherapy would be of benefit to any child with disabilities?

5.2.1 Case study One

The first set of scores is related to the performance of the child diagnosed with Robertsonian translocation, during hippotherapy.

5.2.1.1. Child diagnosed with Robertsonian translocation

The descriptive analysis of total data as recorded by the HOS-2 scale (Appendix), showed a tendency of certain interest (see Figure 1). The descriptive analysis of total data gives a general idea of the child's overall progress.

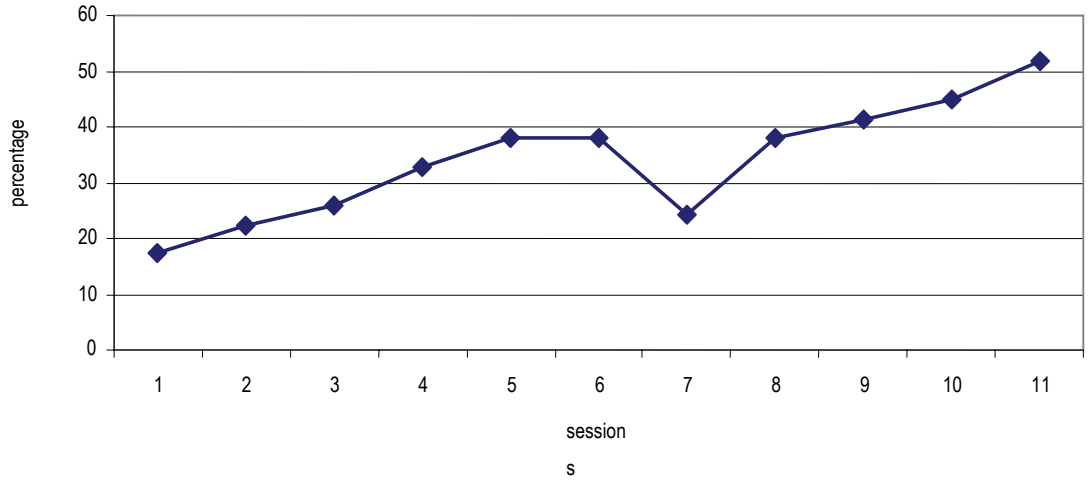

Figure 1. Child One's overall progress during the hippotherapy sessions

Then the 11 sessions were analysed, confirming that of the 56 items that compose the scale, a total of 40 (68.96%) appeared at least once during the 11 sessions, and of them 10 (25%) appeared in the first session.

Concerning overall performance, the data show that the child did the items described in each area in the HOS-2 observational scale at least once.

The overall percentages of the child's behaviour in each therapy session were also observed. In the first session we recorded 17.24% (n: 10). This was doubled during the fourth session and increased to 51.7% (n: 30) in the last session. The first finding

related to this child's overall performance was therefore positive and improved during the therapy.

The overall results recorded in each area specified in the scales may be observed by hippotherapy session in the following figure.

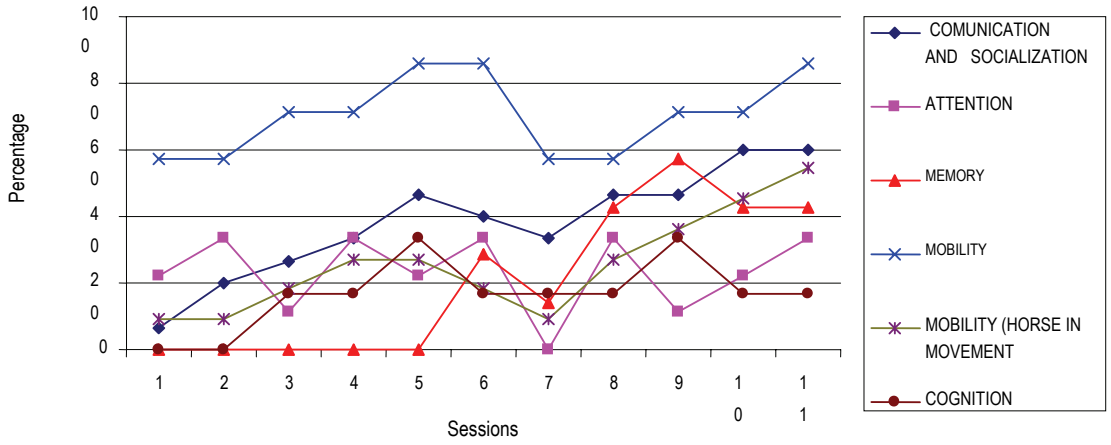

Figure 2. Child One's progress in specific areas during the hippotherapy sessions

The data show that in the area of mobility (horse in movement) and communication, the percentage scores increased from 6.7% (n: 1) and 9.1% (n: 1) in the first session to 60% (n: 9) and 54.5% (n: 6), respectively in the last session registered. The data for areas of memory and cognition do not show positive behaviour in the cognitive area (16%) (n: 1) until the third session and in the area of memory (until the fifth session (28.6 %) (n: 2).

On the other hand, when observing the data related to attention, it is important to notice that in the first session, the child performed 22.2% (n: 2) of the activities planned in the scale for this area, and there are very few changes or irregularities in any of the sessions.

Table 5. Child's one behaviour as defined in real numbers as the percentage of the eleven sessions.

COMUNICATION AND SOCIALIZATION	GREETINGS	Say hello when the therapists come	4	(36%)
		Say hello to the horses in the stable	3	(27%)
	APROACH	Feed the animals	11	(100%)
		Cares horse (beginning and the end of the	8	(73%)
	NON VERBAL LANGUAGE	Hugs , pats and kisses	6	(55%)
	VERBALIZATIONS	Combines two different syllables /say words	7	(64%)
	ORDERS	Give- Take	7	(64%)
		Guide the horse using mimic/ body parts	9	(82%)
		Guide verbally (arre)	8	(73%)
ATTENTION	IMITATION	Mimic songs	1	(0.9%)
	LOOK IN DIRECTION OF SOUNDS	In direction to the other children	8	(73%)
		In direction to the therapist	8	(73%)
	OBJECT ORIENTATIONS	Take trees leaves	6	(55%)
MEMORY	LONG TERM MEMORY	Helmet place	6	(55%)
		Horse-brush place	4	(36%)
		Straw place	2	(18%)
		Stable places	4	(36%)
MOBILITY RIDING THE HORSE	FINE MOBYLITY	Touch objects	11	(100%)
		Touch textures	11	(100%)
		Brush the horse	7	(64%)
		take out straw	9	(82%)
		Feed the animals	11	(100%)
		Reaches strides	3	(27%)
		Order with foots	5	(45%)
	GROSS MOBILITY	Look sides	6	(55%)
		Ride with no hands	3	(27%)
		Blend forward	11	(100%)
		Exercises feet and hand	4	(36%)
		Move both sides	2	(18%)
		Blend forward	11	(100%)
COGNITION	IMITATE GESTURES	Take and thrown (colour sheet)	6	(55%)
	POINT TO/ DISCRIMINE	Horse body parts	5	(45%)

During the therapy, he did a wide range of behaviour in the different categories:

A) Communication and socialization. The child was quiet from the first day, calm and really shy. He came with his mother, said hello to us and waved his hands, and moments later looked down, avoiding our attention. In the third session he started to open up and to kiss and hug us, feed the animals straw and command the horse with his feet. He started therapy with a very low language level, using only sounds and monosyllabic words to express himself. During the sessions, he start to use words for riding the horse, using the expression “arre” and the disyllabic word “Mama” to call his mother. And he has greatly improved in the area of mime, moving his head to say no and moving his foot to move the horse. He worked on the exercises on giving and taking objects and taking care of the animals, performing very well in both. He spent a lot of time playing with the dogs, chickens and cats.

B) Cognition. We used a big piece of different coloured fabric to hide the child and he played at finding the way out. During the first sessions, he reacted slowly and didn’t want to come out, so we played like this while he was riding, so we could keep him from looking around. This was really effective and he quickly learned to take off the fabric and throw it down. Another exercise that he loved was to point when talking about the horse. First he imitated us and later he started to point without our help.

C) Attention. Our evaluation takes into account that the child suffers from simple partial epileptic seizures that make it hard for him to maintain his attention. When this happened, sometimes 20 times during the therapy session, we explained the rules of the exercise again and started again. Most of the time the child watched what the other children were doing and tried to get near them, especially when he finished and the other child from the same school started. He loved to play at taking leaves from the tree when he passed near it, sometimes when he needed a change and play with other objects because of his limited attention span.

The child did not imitate us, either orally or in the mimicry exercises. When we sang to him, he always smiled, but he did not follow our instructions to continue the song alone.

D) Memory. We believe that he anticipated where the places for the helmet and brush were, as when we were near the place for the helmet, he wanted to run away, because he did not like it, and the opposite with the brush, which he always ran to touch.

E) Mobility. The child's performance in the fine mobility development exercises was very good. He loved to touch things with different textures, like the brush, straw and the horse's hair, but not so much the stirrups and helmet. It was hard to make him take the stirrups or be near the helmets. He liked to look around when he was riding the horse and it was a big surprise to us as he is such a shy child, always looking down, but not when he was riding.

5.2.1.1. Mother's therapy experiences

Research Question A: "I feel the child is now more attentive and feels like doing things. He is more relaxed when he comes home and can stay alone for a while. He is also more communicative with us and especially with his sister. He has started to say "Mama" and the other day said *arre* and everything thanks to the therapy. He has fun and loves to be in the hippotherapy surroundings, where he has so many things to do with the horses and sand, which he loves so much that we had to buy him a rake to play in the garden". Research Question B: "No, now I can't see any barriers". Research question C: "I think that hippotherapy is one the most beneficial therapies there are, because I feel that my child is constantly stimulated".

5.2.1.2. Hippotherapist's therapy experience

As a result of the therapy, the hippotherapist has noticed several significant changes in the child's behaviour:

Research Question A: "As part of the child's progress in communication and socialization, I can say that although he never says hello to me when he arrives, I feel he is looking at me differently. He doesn't look at me like a stranger. When he arrives he recognises me and smiles at me, things that he didn't do during the sessions before. I think he knows his name, although he never says it, but he does say some

words, such as mama (or mamamama), ‘more’ (to say ‘more water’), *arre* and some other sounds similar to words, but I don’t feel there is any two-way conversation. He doesn’t pronounce more than 2 syllables together. His usual tantrums are less frequent and don’t last as long. I notice his attention has improved and is more selective, I think he sometimes works at being very selective, and is when he wants to be. When he wants to, he is able to follow instructions. He remembers and recognises the hippotherapy centre and me, and there is one horse that I notice he loves especially, and always looks at. He knows where the she-donkey is and loves to ride her. Concerning his fine mobility…the child claws, he use his hands to grasp things, but only when he wants to, because when we tell him to take the reins, he takes them, but drops them quickly, and doesn’t want to hold on to them. He picks up and touches the brush, because for him the sense of touch is a strong stimulus, but when he needs to uses it to brush the horse, he drops it. But lately he has brushed the animal several times without further instruction. He walks slowly, rocking from side to side, but when he is riding the she-donkey, he keeps his balance perfectly, even when the animal jumps. Before, he walked with difficulties when we crossed uneven ground, and fell down in some places. Now he is walking better, never falls down and avoids small obstacles. He has acquired knowledge related to the therapy centre surroundings, knows the spaces, persons and animals. He especially loves the dog, Dudi. During the relaxation exercises, he has different moods; sometimes he is angry and cries, at others he wants to go with his mother, and at others he behaves well for no apparent reason. But when we ignore him, everything goes better and he works on the exercises. When we finish the sessions, he likes to play with us with the pebbles and he is happy and quiet.”

Research Question B: “The number one challenge is not having as many volunteers as we need. The main challenge that I remember related to the child, although I don’t think it is really a challenge, is something that has interfered somewhat with the therapy. About one month ago the child started vomiting, first occasionally and later exaggeratedly. I asked the doctor about it and he said that it could be because of his immature stomach”.

Research Question C: “Of course I recommended the therapy, because there are so may influencing factors which when made good use of could be included in the therapy, but I don’t think that it is effective for everyone and not for all disabilities. I think it is very beneficial for all the children and their parents in our hippotherapy sessions, given the beautiful setting, and I think it has become a social club where they can come and talk about their problems with their children. I think the environment makes the atmosphere different from a clinical setting”.

5.2.2 Case study Two

The first set of scores consists of the information related to the performance of the child diagnosed with unbalanced translocation during the hippotherapy.

5.2.2.1. Child diagnosed with unbalanced translocation

As described in the section on procedure, during observation in the hippotherapy session, the HOS-1 scale was used to collect data on the child diagnosed by unbalanced translocation. After analysing observations during the eleven hippotherapy sessions, results of the 53 items on the scale show that only 29 (54.71%) were observed in the child’s performance (See Figure 3).

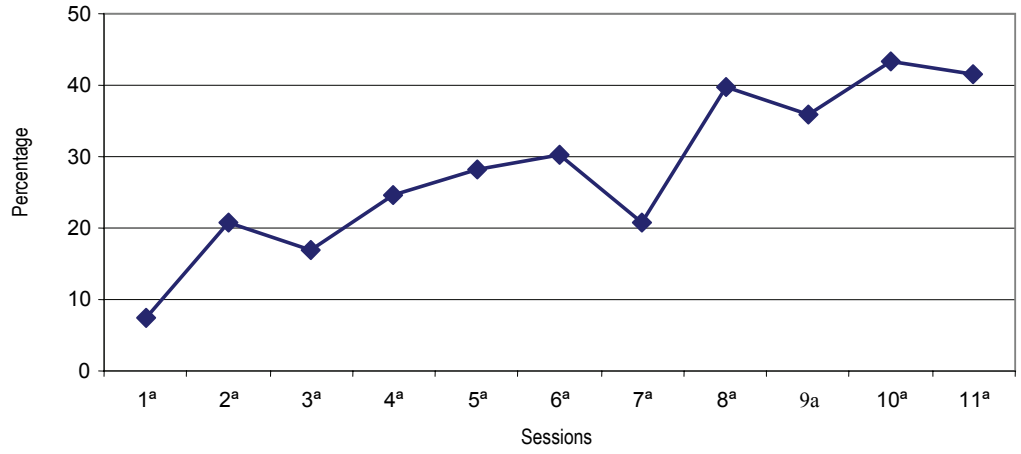

Figure 3. Child Two: overall progress during the hippotherapy sessions

Of all of the activities, only one (looking in direction of musical objects), excluding the control observation referring to relaxation, was recorded in the first session. The data retrieved from the scales is represented by the global results in the figure below, where it may be observed that the child progressed from 11 items performed (21% of the total activities planned) in the second session to 21 (39.6%) in the eleventh session. The data also demonstrate the slight variation between the first and the following sessions. In no session does he perform more than 23 activities (43%), shown in the tenth session.

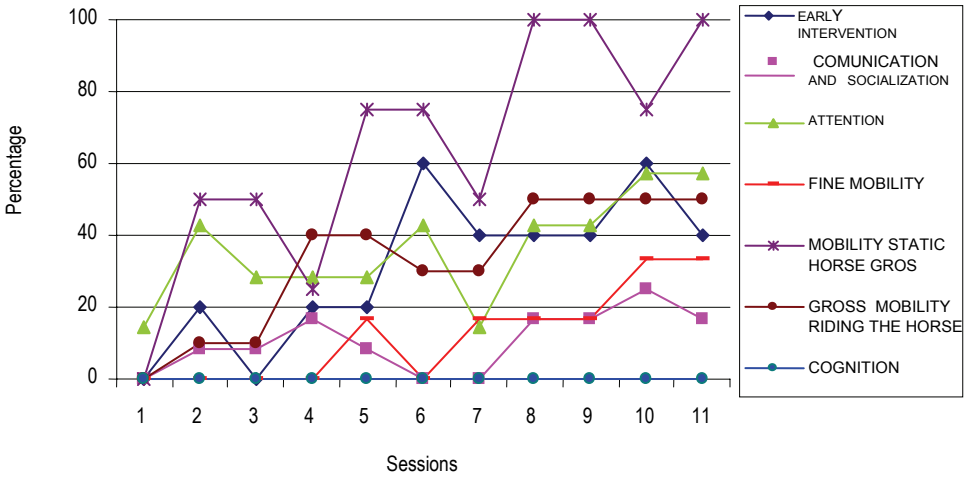

Figure 4. Child Two: Progress in specific areas during the hippotherapy sessions

The figure above shows the results of the activities performed by the child according to the data in the categories defined by the scale.

It should be emphasized that the child's development as observed in the analysis of data concerning gross mobility improved from the second session, when he performed only 2 activities (25%) to 5 (75%) in the sixth session and on to achieve 100% of the activities planned, maintaining 75% to 85% of behaviour learned in the previous sessions. Of the early intervention activities recorded, the second activity planned in this area increased from one performed in the second session (20%), to three during the sixth session (60%), and similar performance was maintained at between 40% (n:2) and 60% (n: 3) in the following sessions. Behaviour

corresponding to the attention area was observed to increase from the first session to 50% in the last sessions. The four gross mobility activities performed riding the horse during the forth session increased to 5 (50%) in the eighth session, and was maintained through to the last session evaluated. In the rest of the areas, communication and fine mobility, a maximum improvement of 25% (n: 3) to 33%(n: 2) was observed.

Table 6. The percentage and frequency of child Two behaviour during the eleven sessions in a clear descriptive manner.

ACTIVITIES EARLY INTERVENTION	AUDITORY PERCEPTION	When the child cry	6 (55%)
		When the psychologist change the activity	6 (55%)
	MOVE HIS HAND TO THE MIDLE-LINE OF BODY	Move the right hand with the musical brazalet	5 (45%)
COMUNICATION AND SOCIALIZATION	GREETINGS	Look when the therapists come	6 (55%)
		Look at the horses in the stable	3 (27%)
		Look at the farm animals(dogs)	3 (27%)
	VERBALIZATIONS	Repeat same syllable (ma- pa-ba)	2 (18%)
ATTENTION	IMITATION	Sounds	6 (55%)
	LOOK IN DIRECTION OF SOUNDS	In direction to the musical objects (bells)	11 (100%)
		In direction to the people (children)	4 (36%)
		Balls	5 (45%)
	OBJECT ORIENTATIONS	Trees leaves	2 (18%)
MOBILITY FINE	FINE	Touch objects	5 (45%)
		Reaches objects(balls)	2 (18%)
		Reaches strides	1 (9%)
MOBILITY STATIC HORSE GROS	DECUBITO PRONO POSITION	help palmar pressing+ stimulation	9 (73%)
		Help palmar pression	7 (64%)
	HOLDS CHESS AND HEAD ERECT	Give the bell – raise the head	4 (36%)
	BE LYING FACE UP	Take the hand and sit the child	8 (73%)
GROS MOBILITY RIDING HORSE	SEAT	Move legs alone	5 (45%)
		Seat alone	6 (55%)
	KNEEL DOWN	Help to crawl	7 (64%)
	BE STANDING	Help to crawl	4 (36%)
	RIDING	Move head up , down , side to side	8 (73%)

It was designed to detect the child's specific activities and behaviour. This table is the summary of results of analysis of the items on the scale. It is important to consider that the child did not do anything in the cognitive area. It should be stressed that the relevant data was retrieved using structured observation classified by main categories during the evaluation process.

A) Early intervention. The child has the habit of always looking down when he comes to the therapy sessions. Although when he is sitting he can control his head, we could not use the stroller for transport because the path is mostly irregular ground. The team then planned for the hippotherapist to take him out of his stroller and carry him in her arms while one of the volunteers helped the child hold his head up. During half of the therapy sessions the assistant was with him moving his head to look at people's faces when they were speaking. The child gradually started to feel comfortable with the hippotherapist, was able to control his neck and move his head alone. During the sessions, the hippotherapist explained the changes of activities to the child, especially when he became angry and cried. Until the sixth session, he did not quite respond to this kind of auditory stimulation related to oral communication while not in a sitting position. Later, he started to anticipate answers in significant situations and answer while looking at us, using body movements and not crying. He was usually very lazy. The musical bracelet was useful to get him to use his hands. From the first session he started to move both hands to the midline of his body until in the fifth session he began to clap.

B) Communication and socialization. The child started to feel confident and look at the therapist and volunteer in the sixth session, and later he looked at the horse's face and at the dogs. He always made low sounds to express happiness and sadness during therapy, and we could anticipate when he was going to cry because we saw his eyes begin to tear. These imperceptible sounds got stronger and louder and by about the ninth session he said some syllabic sounds as (ma and pa).

A) Attention. The child loves the bells. From the first moment we showed them to him he wanted to get them. We tried to reinforce every sound and see what the child

did with persons, animals and objects, and he started to respond very well from the sixth session. For example, we used a big colourful balloon that had something inside to make noise, and we put this next to him, first on one side and then on the other, and waited until he looked at the balloon. Until the sixth session he had some difficulties, but by repeating and repeating, he did it quite quickly during the last sessions. The tree leaves exercises were performed while he was riding, but he didn't show any interest in them, only twice and by chance.

B) Mobility. As may be seen in the table, many mobility exercises were planned. First I will explain some relevant incidents that are not in the table.

Some important things happened when we were working with the stationary she-donkey. The child was sitting on the animal's back and by using palm pressing stimulation he moved toward us into a sitting position. As in almost all the exercises, at the beginning, he didn't want to make the effort to move. We had to stimulate him, but incredibly fast, in only two more sessions, in the fourth, he started to move alone and stand up from a sitting position. Whether he touched an object or not depended on the characteristics of the object. He usually didn't want to move his hand closer to certain textures like the straw and the stirrups or heavy objects, such as the coloured brush.

5.2.3.2. Mother's therapy experience

Research Question A: "During the last month, my child's global development has improved… for example, when he looks at me he pronounces two-syllable words like 'mama' and '*tata*' to call his aunt. I feel so proud of him! I think that thanks to the therapy he can sit alone for a while on his mat and relax and play with his favourite toys. He loves one called 'Gusilux' that lights up and has a lot of different colours; I think the hippotherapy exercises have been incorporated in his performance. He is more attentive; when I call him he reaches out and looks at me and obeys some orders, for example if I say 'no' he stops doing whatever it is he is doing. I think that he sometimes doesn't obey me because he is very lazy…. Last month he started to use body language to express himself, for example, when he is happy, he claps the

hands, and when something surprises him, he puts his hands on his head. For me, the biggest step in his development has been that he tries to walk and move his feet …. With help, as you can imagine! He obeys orders when I tell him take something, but when I ask him to give me things… he doesn't do it."

Research Question B: "No challenges… none at all and I think the therapy, the time schedule and the psychologist are perfect for him. The only time he didn't come was when he caught a cold."

Research Question C: "I recommend the therapy for all children with special needs, and I believe it's the therapy that is doing the most for him"

5.2.3.3. Hippotherapist's therapy experience

Research Question A: "His tone and postural control have improved considerably, although I think it is difficult to associate this improvement only with hippotherapy, because he is attending a lot of different therapies! I think his attention has improved too; now when you call his attention, he looks at you and responds by making guttural sounds."

Research Question B: "The challenges are related to his excess weight. His endocrinologist says that he is ok, but I don't believe it. He is really hard to move!! And we need to work on the problem with the lack of muscle tone in his legs, working his muscles slowly, until he is strong enough to walk."

Research Question C: "I recommend hippotherapy for children with special needs at all times, but especially children with motor problems."

5.3.SUMMARY

This chapter presents the baseline evaluation data that I used to prepare the exercises, hippotherapy scales and evaluation of the children in eleven sessions during a four-month period. As a summary of the data, the children's overall progress during the evaluation period seemed positive.

CHAPTER 6. DISCUSSION AND CONCLUSIONS

The purpose of this study was to find out and describe how holistic hippotherapy could affect and improve the life of a group of children diagnosed with rare congenital disorders. As mentioned above, the sample in this study was limited during writing to only two children due to the restrictions placed on length. The sample finally selected for inclusion in the thesis was made up of one child diagnosed with Robertsonian translocation and another child diagnosed with unbalanced translocation. In the previous chapter, the data collected were analysed, and the following discussion is based on these results in relation to the general propositions, based directly on the effects of the therapy on these two children within the theoretical framework as reflected by their current condition. These propositions relate to learning during therapy, and in the discussion and conclusions, this sense of learning is related to the data. The analyses of the children were described by area, such as communication and social skills, cognitive functions (e.g., memory and attention), mobility and relaxation. The general proposition based on the theoretical review are presented below (Biery & Kauffman 1989; Britton, 1991; Beck & Meyers, 1996; Delius, 1998; Reichert, 1998; Barker, 1999; Taylor, 2001; Fischbach, 2002; Haehl and McGibbon, 2002; Pesce, 2002; Vidrine, Owen-Smith & Faulkner, 2002; Hernández N, 2003; Macauley, & Gutierrez, 2004; Miller & Alston, 2004; Van Der Heide, Fock, Otten, Stremmelarr, & Hadders-Algra, 2005; Scott, 2005; Narha, 2006; Randall, 2007):

Table 7.-Thematic categories

1. AREA: LANGUAGE AND COMMUNICATION

Proposition A	The children's language and communication skills improve with the therapy
Supporting theory for Proposition A	The use of animals in therapy creates a communicative situation

2. AREA: SOCIAL DEVELOPMENT

Proposition B 	Children receive social benefits from the therapist, horses and environment.
Supporting theory for Proposition B	Children can learn values and attitudes through their interaction with the animal (catalyst for social and verbal interaction in children with special learning needs), which can then be applied at different levels (relationships with peers, therapist and outside the therapy setting).

3. AREA: COGNITION

proposition C 	Hippotherapy as early intervention helps increase and develop the child's cognitive mechanisms, such as memory and attention.
Supporting theory for Proposition C	Theory of neuronal group selection. New sets of experiences in the hippotherapy activities, (early intervention) create a unique pattern of neuronal connections. Starting in infancy, experience acts upon this pattern, modifying it by selectively strengthening or weakening connections between neuronal groups, or creating entirely new connections. These maps (brain connections) are dynamic in that they are continually redrawn according to our perceptions.

4. AREA: MOBILITY

Proposition D 	Children's energy expenditure during walking and gross motor functions improves.
Supporting theory for Proposition D	The swinging rhythm of the horse's multidimensional movements is transferred to the child's pelvis in a manner that duplicates the normal human gait.

5. AREA: RELAXATION

Proposition E 	Children feel relaxed with a feeling of peace and quiet after or during the therapy.
Supporting theory for Proposition E	The temperature of the horse's body is higher than the human body temperature, increasing plasticity and relaxation.

6. THEMATIC CATEGORY: FINAL CONCLUSIONS- LEARNING AND DEVELOPMENT

Proposition F 	Hippotherapy enhances the child's development
Proposition theory for Hypothesis F	Theory of sensory integration: the basic sensory and motor components of the therapy influence the child's learning and behaviour.

There are no case studies using hippotherapy as a holistic intervention for small children in the literature, so this thesis is based on original research. The studies on children in the literature are for cerebral palsy and autism, making it impossible for me to compare the data from the children in my thesis to other cases. Below, I discuss the summaries of the children's performance in the therapy setting as prepared by the team for the parents' information. Because of this valuable, beneficial information prepared by several different professionals, I consider it important to discuss their content.

6.1. DATA DISCUSSION. CHILD DIAGNOSED WITH ROBERTSONIAN TRANSLOCATION

The first time that I saw this family, they received me with drastically negative medical assessments. The medical reports described the child as having a severe developmental delay with almost no possibility of learning, and that this situation was caused by a genetic abnormality inherited from the mother.

The mother was really at a loss, depressed and overcome by feelings of guilt, and leaving her with no courage to talk about her child. The whole family saw his diagnosis as hopeless, but especially the mother, who did not want to accept the child's condition. The Spanish health service did not give the family the opportunity to see a family psychologist, whom they really needed, until the University offered this hippotherapy treatment. From the first moment, we thought that the most important part of our early intervention should be to work with the entire family so they could feel like they were participating in the child's improvement.

A) Child's development in language and communication.

Expressive language. We know from his medical report that from an early age the child was able to repeat sounds and imitate intonation patterns, but by the age of 42 months, his language ceased to develop and he was only able to say mama and papa. Now the child is 68 months old, and we have tried to reinforce this kind of behaviour, like vocalizing sounds; after the eleven sessions, the child continues to say mama and papa and has also started to use new words relating to riding ("*arre*") and said "no" and "more" orally. He may not be able to speak in the future and it would be more practical to try with an alternative and augmentative communication, such as Makaton vocabulary (Grove & Dockrell, 2000) or lexigrams (Romski, Sevcik & Pate, 1988, Millar, Light & Schlosser, 1999)

Communication. The child learned to treat the animals gently and take care of them. He stopped having his usual tantrums, and started to show affection for the therapist and his parents. He went from being a shy child to a very interactive friend of the

other children who come to the therapy setting, especially the other child from his class at school, who started the therapy just when he finished. He was especially fond of "Dudi" (his favourite dog) and became particularly attached to him. His receptive communication increased. Some examples of this are: During therapy he followed many simple orders, such as take, touch, cross, point to and brush, but always when he can get something enjoyable before he does it. Another important point is that he doesn't want to imitate us when we, the therapists, ask him to do something we are doing. He just smiles and laughs. But this is not what happened when he was with other children or animals, especially during the last sessions. He loved to play with the other children and animals and did imitate them. When he was riding the horse, the child learned several concepts describing spatial orientation, like up and down. We believe that the child became more communicative because the therapy gave him the opportunity to share new experiences with the animals with his family and classmates (Macauley & Gutierrez, 2004).

B) Social development. The child learned and practiced different ways of relating to animals. He expressed care and concern for the dogs and the horses during therapy, making sure that they were safe. This behaviour was extended to the way he related to others and others related to him in the wider social system. He also learned to relate to other children and become more assertive. The daily schedule prepared and adapted as a routine had positive effects at home. At home, the child started to participate and cooperate in home activities, helping his mother with chores and following family rules, and this united the family. The effects on the reality and dimensions of this phenomenon are similar to those reported elsewhere (e.g., Sentoo, 2003).

C) Cognition. In the context of the therapy, we used materials that the child really liked, like books with pictures of animals, and we worked with the entire family at recognising what animals we had there and what they were called. He followed the instruction very attentively and started to play at pointing with us. The family bought a book for him. It was something new that they had never tried before and was very

effective in increasing the child's attention. Concerning memory, the child anticipates events and places, and knows how to act to get something he wants. During therapy he looked for the brush because he loved its feel. And he is able to recognise himself as the cause of events; he always smiles when he does something wrong. The child's cognitive level is basic and he is making slow, but gradual progress. For this reason, it was really important to us to show these small steps to the parents so they could celebrate it.

D) Mobility. We played with him using balls and rings to improve spasticity in his legs. The horse's gait provides a precise, rhythmic movement which helps the child acquire postural coordination and significantly improves learning experiences (Benda et al, 2003). With only eleven sessions, the child now plays much more with the balls, kicking and throwing hard. He can stand on one foot and do somersaults in the grass. And his locomotion has also improved. He was able to get up out of a chair and stand, and went up and down the stairs alone. Several times, the child ran for at least three meters without stopping while playing with the dogs. These improvements may be attributed to muscle massage and stimulation received while riding (Biery & Kauffman, 1989).

The team worked on the child's fine mobility and thought that he was better than before. For example, he played at turning the pages of the animal book and running the brush through the horses' manes for the fist time in his life during the therapy.

E) Relaxation. The family expressed their gratitude to us as they feel the child is calmer and more relaxed at home. The hippotherapy techniques loosen the joints and relax the musculature and thus help the child improve locomotor skills and basic control, as the mother told the team (Lechner, Feldhaus, Gudmundsen , Hegemann, Michel, Zäch & Knecht, 2003).

This case study provides some preliminary objective data on the effects of hippotherapy sessions as a holistic intervention. To collect the information and carry

out this therapy, we needed the support of a large team of professionals and especially, the family. The family's participation was crucial to managing the intervention in only 4 months. The idea that the therapy was for all of them changed their lives, especially for the mother. It started to break down the wall between her and her child. The family worked hard to collect all the information that we needed for the baseline in October, and they were also very cooperative in follow-up activities at home during the therapy stage. The interdisciplinary team was indispensable. In this case, the mother made the connection with the schoolteacher, who tried to adapt the exercises to the classroom setting. After four months of hippotherapy sessions, the child had changed quite a lot, mainly in the social and fine mobility areas. It was also found to be especially useful in improving the child's gross mobility and memory. These improvements can lead to a better quality of life and increased independence for the child. The family decided to continue taking the child to therapy as the main early intervention all year long.

6.2. DATA DISCUSSION. CHILD DIAGNOSED WITH UNBALANCED TRANSLOCATION

The child's main assistance came from his mother. She knew about the high risk of her having a child with chromosomal disorder before and during the pregnancy. During evaluation, we felt that she showed a state of anxiety and impulsivity manifested in the constant help she gave the child, mainly overfeeding. The child was extremely obese, affecting his obvious hypotonia, and making him unable to move. When the child was born, the child was the centre of the mother's world. She left her job to be at home with him and this relationship became completely interdependent with consequences in her marital relations.

From a professional point of view, we believed that it was of primary importance to work on daily habits at home before starting with the child's direct therapy. The main thing was to make the mother and father understand that their child had more

potential than they thought, and was able to develop, but always advising them during therapy of the child's limitations. We defined the child's possibilities in concrete areas along with therapy for the mother in attempt to change her beliefs and attitudes about her child's possibilities as reflected in her expectations, and specifically in the child's behaviour. The general family involvement and participation in all of this was crucial to improving his independence and quality of life. The child's improvement during the four months as assessed by the team is classified in the different areas.

A) Child's development in the language and communication areas. The child's behaviour in these areas was quite the same as the baseline data but more consistent. We started with the most basic behaviour and increased activities from his baseline. The therapists were able to make the child a participant in his actions, and started to form a good relationship with him. He learned to stop crying when they spoke to him and feel comfortable and participate in interactive situations. The child's visual contact increased, mainly when he was riding the horse, when he looked around and explored the surroundings for a relatively long time (minimum 3 minutes). Our opinion, confirmed by the speech therapist, was that he may have delayed development of language skills due to decreased muscle tone in his face and mouth. But during the therapy, we saw that the child tried to answer us when we spoke to him and several times he even said and repeated the same syllables during three sessions (Lehrman & Ross, 2001).

B) Social development. The child started to explore everything around him. During the last sessions, the child saw and watched the therapist coming, and also animals' faces for several minutes.

C) Cognitive development. The professionals were unable to focus during this time on the exercises in this area. They taught the child to focus on looking around thanks to improvement in his neck, and to attract his attention with sound and movement.

D) Mobility. These results show that rehabilitation in the form of hippotherapy is followed by an improvement in the subject's balance, which in turn reflects a better postural tonus of the trunk and head, which become more stable. The mother attributed his crossing the midline, balance and better coordination to the therapy.

E) Relaxation. Skeletal deformities are a common characteristic in children with hypotonia due to their tendency to assume abnormal positions. The riding relaxation techniques helped the child to inhibit abnormal movements and postures (Rolandelli & Dunst, 2003).

The child was being given many different types of therapy and so it was complicated to contact all the professionals and coordinate main goals and activities related to the activities planned in the hippotherapy sessions. The nature of the syndrome made it difficult to see his progress during the therapy. The child had severe hypotonia, which involves decreased tension in the fine muscles, making upright posture difficult to hold and independent movement difficult to produce. It is also referred to as decreased muscle tone, flaccidity, or floppiness. Hypotonia is related to the child's multiple genetic disorders including muscular dystrophy, and myasthenia gravis. Children with these special needs are at risk of developmental delays in motor skills, poor reflexes, and limited sense of balance. (Fletcher-Lanzen & Reynolds, 1999).

The professional team made the child able to benefit from exploration of his environment and we believe that was a great improvement. We think that due to the therapy, the child made a little progress in the areas of gross mobility, attention and communication and sociability. In this case study, the most important thing we learned as therapists was to allow the child enough time to feel comfortable before starting the exercises and the repetition of the activities. Cooperation with the mother was slow during the first month, but we finally worked together. She also started to implement the exercises at home with the family as a major agent of change in her child's life. The family's motivation was excellent and became an important factor for programme adherence. During these therapeutic experiences the mother felt there

was a huge improvement in the child's development, and the family decided to continue bringing the child to the therapy all year long.

6.3. GENERAL CONCLUSIONS

To finalise, as s professional, I believe hippotherapy can help such children as these and their families to enjoy a better quality of life. This complex therapy involves many necessary elements, such as excellent family support, good horses and animals, good instructors and a multidisciplinary team, which together help the child to develop positive learning. Collaboration of family, professionals and the horse are fundamental to making hippotherapy effective. It has been demonstrated in this thesis that the horse contributes to the child's self-esteem, as when the child rides, he looks at the world from above, and this movement also influences the muscle tone in his neck. Through the repetitive, rhythmical movement of the horse, the child experiences and begins to anticipate movements with each step of the walking horse. Children learn to produce compensatory movements that reduce the displacement of their centre of gravity and keep them on the moving horse. Practice and experience are believed to lead to the modification and reorganization of the central nervous system. By simultaneously affecting multiple systems, such as the sensory, muscular, skeletal, limbic, vestibular, and ocular systems, hippotherapy can promote modification and reorganization of the central nervous system and increase the likelihood that learning will be evidenced in movement patterns used in other environments (Casady & Nichols-Larsen, et al. 2004). The participation of the child's peers and family motivate all to create "a social club" where everyone is a key player, and especially the children, who become more assertive, social and communicative. The multidisciplinary and interdisciplinary team came together as a group of people with complementary skills committed to a common purpose, to provide the best services to the children and their families (Junor, Hole & Gillis, 1994). That the children improved in only four months in all the developmental areas is an indication of the result of the hippotherapy.

CHAPTER 7. LIMITATIONS AND RECOMMENDATIONS

This qualitative study of the benefits of hippotherapy has been primarily descriptive, focusing on observations and subjective reports of therapist, researchers and parents, and supplemented by objective data retrieved by observation of the children's performance during the sessions. Researcher bias was addressed by having an interdisciplinary team, not involved in the riding programme itself, assess the therapy plan.

There was too little time and opportunity to perform all the activities planned in only four months available for data collection for this thesis. The team did not have time to perform all the activities planned in the session time. In future studies, I recommend that the child be more attentive, concentrating on fewer areas and working more specifically on those.

The children were in different therapies at the same time, because they were planned by the city council and were obligatory for the children (multi-treatment interference). We tied to make that positive by coordinating our therapy with the others, but this was quite impossible without the mothers' help. They went to the different sessions explaining what we were working on and the sessions informed us what they wanted to modify. That was really a great idea, and we dealt with it as a very trans-disciplinary team. The consequential negative point in these case studies is that we cannot come to any definite conclusions as to the extent of hippotherapy alone in the children's development. But I believe that the important thing is not the cause, but the fact that they and their families received significant early intervention. To promote the improvements made during the hippotherapy program, we recommend the continuation of practice in the rest of the child's activities with the addition of a home exercise program.

For future research, it is recommended that the number of cases be increased and replicated as a long-term therapy to study its longitudinal effectiveness. I also recommend design of a study that includes a control group, that is, a group of

children with special needs that are enrolled in the traditional therapy but not in hippotherapy.

The use of several specific instruments to measure the children's improvement is very important. In my case, I could not return to Almeria to replicate the children's evaluation using the Portage and Battelle global development scales, so a major problem was the lack of existing standardized measurement tools, although we note that these scales are general, and some of the activities planned with my scales were more suitable to the specific cases.

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APPENDICES

1. CHILD ONE. PORTAGE AND BATTELLE SCALE DATA [1]

A) SOCIALIZATION

PORTAGE	
MONTH	SKILLS
O-2	Watches a person moving directly in his line of vision, smiles in response to attention by an adult, looks at his hands and smiles
0-7	Manipulates objects and gives them to an adult.
12	Touches the adult's facial features. Plays when another child is near but at different activities. Accepts absence of his parents and protests only occasionally.
15	Plays alone for 10 minutes. Explores the surroundings.
18	Searches for eye contact when he is with you from 2 to 3 minutes. Gurgles to get attention.
36-45	Raises his arm to take an object. When called, he raise his arms.
45- 64	Plays alone near an adult (15-20 minutes). Dances to music

[1] The Portage scale provides chronological data on the age of the child when he was able to perform the activities defined. The numbers of months described in the Battelle scale give an idea of the child's actual age as defined by what he can do.

BATTELLE

Adult interaction (child developmental age: 12-17 months).

When an adult speaks, he looks at his face, smiles and responds to the adult to interact, showing that he wishes to be picked up by the familiar person and attract his attention, plays peek-a-boo, distinguishes familiar people and vocalises to imitate sound.

Feeling expression/affection (18-23 months).

Reacts in anticipation, shows pleasure playing sudden movement games, expresses emotions and shows affection for other persons, and loves to hear stories. Loves games that make a lot of noise, such as ball and the piano.

Collaboration (18-23 months).

Sometimes follows daily routines and rules.

Social role (skills undeveloped)

Self-concept (6 – 11 months)

Shows awareness of his hands and responds when somebody calls him by his name.

Peer interaction (18- 23 months).

Initiates social contact with peers, sometimes imitates other children, plays alone when he is with peers.

B) LANGUAGE

PORTAGE	
MONTHS	SKILLS
6	Repeats sounds made by others
24- 36	Imitates voice intonation patterns when others speak
36- 42	Repeats the same syllable to name a personal object and family (‘mama’ and ‘papa’)
42- 50	Answers simple questions with non-verbal response

50- 64	Normally obeys orders. Asks for more.

BATTELLE

Receptive (12- 23 months).

Reacts to a voice; turns his head to listen to a sound, reacts to referent voice tones, associates words with actions and objects, is able to follow 3 simple orders and sometimes follow orders with mimicry.

Expressive (13- 23 months).

Vocalizes sounds, and makes sounds to express his mood, says syllabic series, uses mimicry to express his needs and makes some word sounds.

C) MEMORY AND ATTENTION

BATTELLE

Attention (12- 15 months).

Follows a light from a torch vertically and in 180 degrees. Sometimes looks and points to a drawing.

Memory (6- 11 months).

Follows auditory and visual stimuli; lifts a glass to get what is underneath. Sometimes searches for a missing object.

D) **COGNITION**

PORTAGE	
MONTHS	ABILITIES
6	Removes a cloth from his face
16	Searches for an object that has been removed from his direct line of vision

18	Removes an object from an open box, and puts an object on a box imitating an adult.
20	Puts the object in a box when you ask him to.
56- 64	Shakes a noisemaker; puts 2 objects in an empty box. Takes out a circle from a geometric puzzle. Takes 6 objects out of a container one by one. Piles up 3 blocks. Scribbles with thick pencils.

BATTELLE

Perceptive discrimination (06- 11 months).

Explores his surroundings and reacts to new situations.

Learning and reasoning skills (none).

Conceptual development (12- 23 months).

He is sometimes aware that he is the cause of events.

E) MOBILITY

PORTAGE	
MONTH	ABILITIES
0- 6	Picks up an object 15 cm in front of him and another held 8 cm away. Picks up and takes an object. Puts in, touches and investigates objects with his mouth. Holds up his head and lifts his chest, supporting himself with his arms. He sits with help and passes objects form one hand to the other
7	Sits with the help of an adult
12	Can sit for 2 minutes and tries to stand up by holding onto furniture
14	Lies face down and turns face up and crawls
15	Can remain standing

18	Lies face down to turn somersaults
20- 24	Goes from sitting to crawl position. Can sit up when he is lying face down. Is able to stand for only one minute with a minimum of help.
24- 42	Can go from standing to sitting. Claps hands. Takes small steps without help. Crawls up stairs.
42- 56	Goes from sitting to standing and stays on his feet
56- 65	Walks down stairs. Drops one object to pick up another. Rocks back and forth in a swinging movement. Goes up and down the stairs first one foot and then the other with help. Runs.

BATTELLE

Muscular control (Achieved at 12- 17 months).

Holds his head straight, sits with support, holding his head up and moves it to both sides, can sit without support and can stand for 10 seconds without help.

Body coordination (24- 35 months).

Puts hands together on the midline, puts everything in his mouth, stands up and walks with an object in his hand. Kicks and throws a ball. Sometimes takes two or three steps following a line.

Locomotion (18- 23 months).

Sometimes runs three meters without help.

Fine mobility (12- 17 months).

Holds his hands mainly open, holds an object with his fingers in the palm of his hand, takes a lollypop with his fingers, passes an object from one hand to the other, opens drawers and wardrobes, sometimes gives you a toy if asked.

Perceptive mobility (12- 17 months). Touches an object, puts an object in a bottle and builds a tower with two blocks.

2. SESSION PLAN FOR CHILD ONE (DIAGNOSED WITH ROBERTSONIAN TRANSLOCATION)

The team decided to plan a similar focus of intervention for the two older children. The main hippotherapist for each child had the responsibility of selecting the progress of the intervention and the how to plan each session, but every change and consideration had to be recorded on the observation scale.

The intervention activities during hippotherapy sessions were structured in 6 areas: communication and sociability, cognition (plus attention and memory), mobility and relaxation. Below is an explanation of each exercise:

A) Communication and sociability exercises

We planned the same intervention activities for both the child diagnosed with Angelman syndrome (4 years old) and the one with Robertsonian translocation (5 years old), because they are general and critical to the development of communication and sociability in both children. We based the activities on the fact that the two children have difficulties in using gestures, and in imitating communicative and social behaviour. The therapy will work on improving that by using the animal. Theories agree that the animal can be the first step in helping the child to communicate with peers and family (Rolandelli & Dunst, 2003).

The individuals participating in the activities described are one of the children, his two personal hippotherapist and two assistants in each session:

Hippotherapy activities are scheduled to take place halfway through the morning when other children of the same age are finishing their riding sessions to give them the opportunity to meet them in the therapy setting. This helps them get to know other children, motivating their social awareness and interacting with them in the therapy setting. It also motivates the children to participate in the therapy, in the company of their family or peers, allowing them to share information (Delius, 1998; Phares, 2003). First of all, the child's trust in the horse and in the therapist must be fostered. When the child arrives at the ranch, the therapist greets the child with a kiss and says the names of the horses and her own name, which she repeats several times during the session, to help him feel he is with people he knows. We believe it is important for the child to feel he is in a safe environment and familiar surroundings, and in every session, the psychologist takes the child for a walk around the stables. During the

walk, the child is taught about animal care and the sensitivity of the animals, which can later be used to compare with human care. Just fifty meters from the door there is a big stack of straw used to feed the horses on the ranch. The psychologist takes a little straw and feeds it to the animals, and explains to the child that every animal needs to be fed, the same as his mother feeds him. The therapist plays at giving straw to the horses and lets the child move closer to the horse to let the animal lick the child's hand and face. Later they go on to see the objects used to clean and adorn the horse, the colourful horse brushes. The psychologist plays with the child and repeats the action, "give" and "take". For example, "give me the horse-brush, please". At the same time, the assistants move the horse from the stall to a quiet place and tie him up. The child pats and brushes the different parts of the horse (the horse's ears) and names the colours. During the evaluation the children's receptive communication was observed to be better than communicative, so during the hippotherapy session, the psychotherapist teaches the child how to answer by making gestures or signs. First she take his hands to show him what he has to do, and help him to move his body expressing something in a specific situation, for example, to wave hello when the child arrives, clap when he behaves well, or teach him to move his head to either side when the therapist say "no-no" to the child. Later the child must learn to do the exercise alone, by telling him, "Now you do it." "If I say hello… what does this mean?" (the main therapist does not tell him what to do and does not touch him).

Later, the therapist lifts the child onto the horse's back and teaches him to move his foot to make the horse move and guide it. She lets the child learn to control the horse on several occasions or, if he does not, the therapist tells the assistants to move the animal just when the child moves his foot or the reins, so he gets to know the actions and their consequences. The therapy ends by the therapist, assistants and the child giving the horse a big hug. Considering that the child comes to the sessions with his parents and brothers, sometimes when the child has finished the psychologist lets his brothers mount the same animal. The child should be shown that riding the horse is not just his therapy, but a pleasurable activity for all of his family too.

B) Specific language exercises

While the therapist is walking and visiting the animals, she can teach the child new words for things and their different characteristics. For example, she can work with different sizes and geometric shapes. The horse-brushes are rectangular and smaller than the protection helmets. She mentions all the names of animals to help him to remember them. The language can be taught to the child in a series of two-syllable words related to the horse. The same series is repeated several times (a-rre (giddy up), pa-ta (leg), co-rre (run)), to encourage him to say the words. She points to each part of the horse while touching it at the same time (nose, mane, body and legs). Playing 'Simon Says' with expressions like, "Lift your rear end off the saddle", is fun and encourages the child to talk. It is always important to show the child what he needs to do and then wait long enough to let him perform.

C) Attention exercises

The therapy is flexible and the psychologist decides when the time to do the exercises is appropriate. The psychologist is the model and teaches the child to reproduce the same exercises that she does. For example, sing a popular song adding motions. The therapist sings the song several times and later tells the child to sing along with her. Later the therapist can sing and the child can do the motions. It is important to change the roles during the session. Increased auditory capacity by following up on songs and stories is an important goal. For example, a popular horse story that is based on foot exercises. "The Indian tribe is hunting. The Indians sit on their horses and started to ride (kick the horse's back with the foot to the rhythm). The Indians are climbing the mountain (slow down the leg rhythm) and go down the mountain (quickest rhythm). The Indians cross a wooden bridge (patting the chest). The Indians see the animals and sharpen their arrows (fast strong rhythm). They load their bows and shoot their arrows (ziuuuuuuuuuuuuuu…).The Indians loudly shout their victory!

While the child is riding, around him there are others riding, which may be seen as a social setting. The therapist should try to attract the child's attention to watch what the others are doing.

Other exercises for improving his attention, and at the same time increasing his ability to use numbers, can be a basket with leaves taken from the trees each time the child rides near a tree. When he has gathered some, he can count them very slowly up to five with the hippotherapist.

D) Memory exercises

When the therapist finishes working with the characteristics of the horse-brush, she can hide the object and a few minutes later, the hippotherapist asks him where it is. In later sessions the psychologist can play at hiding more objects at the same time. For example, 2 objects which the psychologist is sure that the child knows the names of, horse brush and helmet. The objects must always be in the same place in every session, so the child remembers where they are, concentrating on where the helmet, the straw and the horse brushes are. If the child gets excited about one horse in particular, this one should be used for the riding activities and the horse's name should be repeated throughout the session.

E) Mobility exercises

Use of different types of materials in the activities: balls, bells, coloured brushes, coloured sticks and coloured rings.

The child does exercises in *fine mobility* at different times during the session. Near the horse, he feeds and brushes the animal using his fingers. He puts on and takes off the helmet at the beginning and the end of the session. While riding, he touches the horse and takes the reins and is in direct contact with the horse in the relaxation exercises. And when the child is ready to let go of the reins from one hand while riding, with the other hand he can take coloured balls, sticks and rings that he is given by the assistants.

It is important to work with the child's *gross mobility* while riding. As the child sits in the saddle, he is lined up, corrected and lined up again when he moves. It is important to correct the child's pelvis, trunk and head. He must learn to control his centre of gravity, and perceive his own body symmetry. When the therapist tries to correct the child's limbs, she must be firm and yet elastic, first one leg and then the other.

Progressive activities: First bells are put on the stirrups. While the child is riding, the bells are effective in motivating him to take the reins. The child learns to guide the horse with his legs and to pull the reins to stop the horse. He learns to look around and move his neck to right and left, and in opposite directions. As he learns to turn his body the opposite way that the horse is going, she works on body rotation. He starts to learn to release the reins with one hand, and to take things and touch the horse with the free hand. The same exercises are repeated with the opposite hand. With his feet in the stirrups the child learns to have both hands free; if he needs it, the hippotherapist holds on tightly to his legs. In the last stage, the child learns to free hands and feet.

When the child has learned to relax, and his feet and hands are loose, the therapist can continue:

Head, shoulder, arm and trunk exercises. Teach the child to touch his feet. With one hand taking the reins, he extends the other hand and tries to touch his foot at the same time he lifts his knee and foot. He must not raise his backside from the saddle, and at the same time he needs to leave the other leg hanging loose and relaxed.

Forward bending exercises. In bending forwards over the horse's neck, the child must have both hands stretched out, and use them to hold onto the horse to maintain his balance. The object is for the child to get as low as possible on the pony's neck by bending from the waist, without lifting his seat or losing his balance, until he touches the horse's mane or crest. The child must raise his head and look between the horse's ears. The hippotherapist should make sure that the child does not let his toes point down or his leg swing too far back as he bends forward from the hips. If the child's feet jerk, or movement is spastic, it is better for the hippotherapist to get him to bend from the hips with his legs straight and his feet out of the stirrups, because this will assist him in breaking his rigid pattern (Davies, 1988).

Leg and foot exercises; working both sides of the body. The child must sit straight, without looking at his feet or bending his body. He moves his foot in circles as he raises it at the same time. First against the horse's side and later separated from it. This can be explained to him by asking him to imagine that he has a piece of chalk between his toes and is drawing a big circle on an imaginary blackboard. Later the therapist can throw a ball and the child can kick it. In another exercise, the rings can be used, placing one around his foot and having

him move them all the time. The child must not be allowed to move the knee away from the saddle or raise his legs.

The child can rock back and forth on his feet, throwing a ball. The therapist tries to get the child to point his toes forward. The child must have his feet in the stirrups. One assistant holds on to his foot to be sure that he does not move it. The therapist moves the child to either side and the child must try to stay in balance and straight in the saddle.

Sensory-motor work. The psychologist motivates the child to touch different parts of the horse (crest, loin, dock, shoulder, ribs, and muzzle) to learn to perceive different textures (hard- soft; smooth-rough).

F) Cognition exercises

The therapist encourages the child to imitate basic gestures like waving hello (ok, good, etc.), smelling the flowers around the horses and imitating coughing and sneezing. In later sessions, when he has said some words, they have imaginary telephone conversations. The therapist pretends the child is calling different places on the farm, or that she needs something the child can offer.

The hippotherapist teaches the child to point to the parts of the body. For example, here is your nose, where is your nose? Later the hippotherapist teaches the child the parts of the horse's body.

She teaches the different horse brush colours and how to tell the difference. The child shows the brush when asked for it. Later, she works with the colours. First with one – the first one that he picks up when all the brushes are put together – and the psychologist repeats the name of the colour several times. Later she takes the brush that is the colour learnt and another, and asks the child for them, alternating the two different colours.

G) Final relaxation exercises

The horse‘s body temperature is 38 degrees, and this warmth is transmitted to the child, relaxing his muscles and ligaments. There are two ways to relax the child; one focuses on the body, the other on the hands.

At the beginning of the session, the child is lying on a blanket on top of the horse. The assistants hold the child’s feet to make him feel more secure. The inductive movement of the walking horse is useful to relax the child. For the child it is extremely relaxing to be held by the assistants in a way that makes him feel protected and at the same time he is manipulated on the horse. The psychologist can try to bend the child backward and forward, and try to lay the child across the back of the horse.

The other type of relaxation focuses on the hands. First the therapist tries to make the child relax his hands and arms. His palms are massaged to release the tension (the psychologist can trace circles on his hand with her thumbs), finishing with the tips of his fingers. She can also massage his palm in small circles with the knuckle of her index finger. When the child has learned this technique, he may be able to reproduce simple relaxation techniques like shaking his hands.

3. CHILD TWO. DATA PRESENTATION PORTAGE AND BATTELLE SCALES

A) HOW THE BABY IS STIMULATED

PORTAGE	
MONTH	ABILITIES
O-4	Looks at his hands
4-5	Responds to visual stimulus by moving his body
6-7	Responds to auditory stimulus by moving his body.
7-12	Moves his head to one side while he is lying on his back.
12-15	Plays alone for 10 minutes. Shakes things. Follows a light with his eyes. Kicks vigorously while on his back.
15-18	Moves his body but does not cry when an adult speaks to him. Cries in different ways in different situations. Smiles. Does not maintain visual contact for more than 3 seconds. Coos and gurgles when content. Repeats own sounds.
18-24	Thrusts arms about in no particular direction. Visually follows an object moved past the midline of his body. Moves his head up, down, from side to side while lying on his stomach. Swipes at objects. Sometimes holds his head up while on stomach for 5 seconds. Follows an object with his eyes in a 180-degree arc. Searches for sounds by turning his head in the direction of the sound. Controls his head and shoulders when sitting propped up with a pillow. Holds an object with his hand for 30 seconds using palmar grasp with involuntary release. Attempts to roll over using his shoulders.

B) SOCIALIZATION

PORTAGE	
MONTH	ABILITIES
10-12	Looks at his own hands and smiles
12-18	Manipulates objects and gives them to an adult. Can play for 10 minutes, observe, take and throw objects. Dances to music. Holds his favourite doll.
18-24	Sometimes smiles in response to the facial expression of others. Holds onto his mother's hair. Reaches for offered object. Seeks eye contact often when watched for 2 to 3 minutes. Sometimes holds an object for 3 minutes. Squeezes or shakes a toy to make noise.

BATELLE

Adult interaction (child developmental age: 12-17 months).

Shows that he knows familiar people. Looks at the adult's face. Plays peek-a-boo. Continues vocalizing and imitating adult sounds. Reaches when we say "mama", looks at her.

Feeling expression/ affection (12-17 months).

Reacts in anticipation, shows pleasure playing sudden movement games, expresses emotions and shows affection for other persons, animals and personal objects (favourite doll and music).

Collaboration (none)

Social role (skills undeveloped)

Self-concept (0 – 5 months)

Is aware of his hands

Peer interaction (skills undeveloped)

C) LANGUAGE

PORTAGE	
MONTHS	SKILLS
14-18	When the mother says no, he stops what he is doing.
18-24	The child repeats sounds made by others. The mother says he repeats the same syllables several times, such as 'ma-ma-ma' and puts different syllables together, such as 'pa-ma' but I did not see that in September. The mother says that sometimes he obeys 3 different orders, such as "be quiet", raises his head and takes an object, but I did not observe this behaviour in the child either.

BATTELLE

Receptive communication (0-5 months).

Reacts to a voice and turns his head to listen to a sound

Expressive communication (0-5 months).

Vocalizes sounds, and sometimes makes sounds to express his mood (feelings).

D) MEMORY AND ATTENTION

BATTELLE

Attention (06-11 months).

Follows light from a torch vertically and in 180 degrees, looks at an object continuously for 5 seconds and pays attention to continuous sounds. He keeps himself entertained without asking for attention.

Memory (0-5 months).

Follows auditory and visual stimuli.

E) **COGNITION**

PORTAGE	
MONTHS	ABILITIES
5-10	Removes a cloth from his face.
10-15	Looks for objects that have been removed from his direct line of vision.
15-24	Shake a noisemaker

BATTELLE

Perceptive discrimination (0-5 months).

Explores his surroundings visually, sometimes reacts when confronted with new situations and explores objects.

Learning and reasoning skills (skills undeveloped)

Conceptual development (skills undeveloped)

F) MOBILITY

PORTAGE	
MONTH	ABILITIES
15-24	Sometimes grasps an object 15 cm in front of him. Catches and grasps the mobile over his cot. He sits with the help of an adult. Reaches for and grasps objects, prefers his favourite doll. Rolls from stomach to back.

BATTELLE

Muscular control (0-5 months).

Sometimes holds his head straight.

Body coordination (skills undeveloped).

Locomotion (skills undeveloped).

Fine mobility (06- 11 months).

Holds his hands mostly open, holds an object between his fingers and the palm of his hand, sometimes take a lollypop with his fingers and passes an object from one hand to the other.

Perceptive mobility (0-5 months).

Touches an object.

4. SESSION PLAN FOR CHILD TWO (DIAGNOSED WITH UNBALANCED TRANSLOCATION)

Our intervention during hippotherapy sessions was structured in 6 areas: early stimulation, communication and sociability, attention, memory, cognition, mobility and relaxation. Below is an explanation of each exercise:

A) Early stimulation activities

These strategies are to be used by the psychologist when she believes it opportune.

When the child cries or when we plan to change to a different activity, we have to be near him and try and calm him down by touching his face and hands and saying comforting words to him, like "Don't cry now, sweetheart, don't cry. Come on now, don't cry anymore". "That's a good boy, be quiet now." We always tried to anticipate the information before the events, not only in order to have evidence on the integration of information, but because the child started to anticipate responses in significant situations and improve his ability to respond to what he hears in this way.

Before riding, the professional must encourage the child to move his arms in a definite direction, and help to him to bend his arms away from his face, by putting a little bell bracelet on one of his wrists, and later changing the bracelet to the other hand.

B) Working with language and communication

When the child enters the hippotherapy centre with his parents, it is always important to say hello and make him feel welcome. Another way to improve the child's communication skills is to walk around the ranch and say the names of the animals that he sees.

The therapist says the different parts of the horse and its colours. Everything must be repeated many times.

When the child is on top of the horse, language and sounds are used to communicate with the horse, and are used to guide the animal orally. Since the child has no oral skills, he is taught to move the horse with the movement of his arms and feet. The therapist and the child

communicate by mimicry so the child can express his feelings. For instance, shaking his head means “no”, and clapping when something interesting happens. This is also used to teach the child to obey simple orders: ‘take my hands and sit…’ The therapist has to facilitate one-on-one communication by babbling to the child, first with simple sounds like ma, pa and ba accompanied by a bell. When the child tries to make the sounds, they are repeated with him. The child gradually learns to associate the bells on the reins with the words. This progresses to a series of two-syllable words related to horses, repeating “co-rre” (run), “an-da”(walk) and “pa-ra”(stop).

C) Working with socialization

These activities are used to establish a good, comprehensive and solid relationship between the therapists, the animals and the child.

When the child and the therapist are together, they gradually touch and get to know the horse. When the child is near the horse, he is encouraged to touch it and put his hand on the mane. Touching is also very important when the child is getting to know the therapist. The therapist can take the child’s hand and put it on his body and face, nose, eyes, and mouth, saying their names. He helps the child to do the same on his own body, and when he touches his nose the therapist makes funny sounds to keep him focused on the activity. In a later session, he asks the parents to bring the child’s favourite toy, and the child can be shown how to give affection, hugs and kisses. This can later be connected with the relationship between the child and the horse.

We use clothes pegs to dress up the horse’s mane and we play a game putting on the pegs taking them off. After that, we play a “give and take” game. First, we take the object and put it in his hand and then say to him “Here, take this.” and later we say “Oh! Give me that beautiful clothes peg,” helping him if necessary. We play with him, saying “This is for my little boy” and then we clap and say, “Please give it back”.

D) Attention exercises

The child's name is repeated several times, patting his chest. A torch is useful for this and illuminates his face at the same time. Turn the light down gradually. Do the same exercises with the horse's and the physiologist's names.

We use a popular song for rhythm games. The psychologist is the model. He sings the song with gestures. If the child imitates the gestures after repeating them several times, the psychologist tells the child to repeat the gestures, "Now I am going to sing and you move your arms, ok?" If the child is incapable of autonomous movement, the model encourages the child, by waiting for movements at the beginning, pauses and end of the song. The therapist teaches the child exercises to improve his hearing. The Indian tale, as described in appendix 2, is one way to do this.

The therapist has to notice what interests the child: persons, colours or movement, and build on that. Every time the horse goes near the trees, the therapist gives him some leaves to help him connect with the place, the situation and a stimulus.

E) Developing mobility

Different kinds of materials are used in the activities: balls, bells, coloured brushes, coloured sticks and coloured rings.

In this therapy, children with central hypotonia receive sensory input from the rhythmic movement of the horse, enabling him/her to adapt to constant postural challenges, thereby improving balance (Britton, 1991).

From the first session most of the exercises are designed to be done with the horse standing still. In the first exercises, the therapist puts a blanket over the horse, like a mattress. The child is put on the horse lying on his stomach and the goal is to get his attention by talking.

In the second exercise, the child is still lying on his stomach while he is supporting himself with his arms, and the therapist waves a toy or a bell in front of his face, in a way that requires him to make an effort to look up at it. He keeps raising the toy higher to force the prone position more. .

In the third exercise, we try to make the child lift his head up. You always have to try to make the child support his head on his own. The best way to do this is by pulling his hands up and out, pressing on the palm of the hands, and this way the child automatically lifts his head.

In the fourth exercise, we place the child on his back. The therapist puts his fingers on the palms of the child's hands. Then he bends his fingers and pulls the child so he sits up.

In the fifth exercise, the therapist makes the child crawl. He puts the child on his stomach and moves one of his hands forward, then the other and repeats this movement..

The therapist can develop the child's ability to stand up, moving him from side to side on top of the horse, helping him to balance so he learns to control his own body.

Fine mobility: The child can give hay to the horses, learn to take coloured rings and clean the hay from the horse's hair.

When the child is able to sit alone, the therapist gradually starts to introduce horse-riding exercises with the active animal.

Gross mobility: The child sits on top of the horse and grabs the reins, using bells tied to the reins; the child tries to grab them when he hears them make a sound.

How can the child be made to feel comfortable riding the horse? The therapist must always place his arms around the child's back as an extra support, never directly on his head, keeping the supporting arm straight to make sure that the child is sitting and his spine is straight. He corrects and straightens the child's pelvis, trunk and head so that he learns to control his own centre of gravity and perception of his own body symmetry. The position of the feet is always corrected in a firm and careful manner, first one and then the other.

For head support (never support the head in the neck area), it is recommended that a hand be placed with the thumb under the jaw, index finger between the lower lip and the chin and the ring finger under the chin. Use a bell to get the child's attention. Ask him to take the bell and repeat what the therapist does. Teach the child to move his feet by kicking the horse on the sides, so it moves and walks. Make the horse move by pulling the reins. Using light to stimulate focus, the child is made to move his head from side to side. Work with objects with different textures.

F) Working with cognition

Put the child on his back with a piece of cloth on his face. Talk to him so he knows that you are there. Laugh and hug the child while he removes the cloth. Encourage the child to imitate gestures like telephone conversations – the therapist can pretend with the child to call different places on the farm or that he needs something that the child can offer. The horse brush is moved from one place to another.

G) Relaxation exercises

The same exercises described for the other children (see Appendix 2)

5. HIPPOTHERAPY OBSERVATIONAL SCALE (HOS1)

CHILD ACTIVITY		CAN/ THE CHILD /DOES HE TRY?		OBSERVATIONS	FOCUS
AUDITORY PERCEPTION	When the child cries	YES	NO		EARLY STIMULATION
	When the psychologist changes the activity	YES	NO		
MOVE HIS HAND TO THE MIDLINE OF BODY	Move the right hand with the musical bracelet	YES	NO		
	Move his left hand with the musical bracelet	YES	NO		
	Separate his hands	YES	NO		
	Look when the therapists comes	YES	NO		COMMUNICATION AND SOCIALIZATION
	Look at the horses in the stable	YES	NO		

GREETINGS	Look at the farm animals	YES	NO		
NONVERBAL LANGUAGE	Clap his hands	YES	NO		
	Wave bye- bye	YES	NO		
	Shake his head – to say no	YES	NO		
	Hug, pat and kiss	YES	NO		
VERBALIZATION	Repeat same syllable (ma- pa-ba)	YES	NO		
	Combine two different syllables in word play	YES	NO		
ORDERS	Give - Take	YES	NO		
	Guide the horse using mimicry/ body parts	YES	NO		
	Guide the horse orally (*arre*)	YES	NO		

IMITATION	Reproduce sounds	YES	NO		ATTENTION
	rhythmic stories	YES	NO		
	Mimic songs	YES	NO		
LOOK IN THE DIRECTION OF SOUNDS	At musical objects	YES	NO		
	At people	YES	NO		
OBJECT ORIENTATION	Balls	YES	NO		
	Tree leaves	YES	NO		
PRONE POSITION	Help palm pressing+ stimulation	YES	NO		MOBILITY (STATIC HORSE)
	Help palm pressing	YES	NO		
HOLDS CHEST AND HEAD ERECT WHILE ON STOMACH AND SUPPORTED ON FOREARMS HANDS SUPPORTS	Give the bell – raise his head	YES	NO		
LYING ON BACK	Take your hand and sit up	YES	NO		

SITS	Move legs alone	YES	NO		
	Sit alone	YES	NO		
STANDS	Help crawl	YES	NO		
FINE	Touch objects	YES	NO		
	Reach for objects (balls)	YES	NO		
	Remove straw	YES	NO		
	Move hands to guide the horse	YES	NO		
	Reach for stirrups	YES	NO		MOBILITY (HORSE IN MOVEMENT)
	Reach for helmet	YES	NO		
GROSS	Move head up, down, side-to-side	YES	NO		
	Move arms to guide the horse	YES	NO		
	Move foot to guide the horse	YES	NO		
	Look to sides	YES	NO		

	Turn	YES	NO		
	Lean to both sides	YES	NO		
IMITATE GESTURES	Take and throw (coloured sheet)	YES	NO		COGNITION
	Smell	YES	NO		
	Catch	YES	NO		
	Take out- put in	YES	NO		
POINT TO/ DIFFERENTIATE	Human body parts	YES	NO		
	Horse body parts	YES	NO		
POSTURES	Lie down	YES	NO		RELAXATION
	Bend forward	YES	NO		
	Cross	YES	NO		

6. HIPPOTHERAPY OBSERVATIONAL SCALE (HOS2)

CHILD ACTIVITY		CAN THE CHILD /DOES HE TRY?		OBSERVATIONS	FOCUS
GREETINGS	Say hello when the therapists comes	YES	NO		COMMUNICATION AND SOCIALIZATION
	Say hello to the horses in the stable	YES	NO		
	Say hello to the farm animals	YES	NO		
APPROACH	Feed the animals	YES	NO		
	Care for horse (at beginning and end of therapy session)	YES	NO		
NON VERBAL	Clap hands	YES	NO		
	Wave bye- bye	YES	NO		

LANGUAGE	Shake head to say no	YES	NO		
	Hug, pat and kiss	YES	NO		
VERBALIZA-TION	Combine two different syllables in word play	YES	NO		
	Name the horse's body parts	YES	NO		
	Name the farm animals	YES	NO		
ORDERS	Give- Take	YES	NO		
	Guide the horse using mimicry/ body parts	YES	NO		
	Guide horse orally (*arre*)	YES	NO		
ATTENTION	'Simon Says'	YES	NO		
	Say his name	YES	NO		

IMITATION	Name body parts	YES	NO		
	Rhythm stories	YES	NO		
	Mimicry songs	YES	NO		
LOOK IN THE DIRECTION OF SOUNDS	At other children	YES	NO		
	At the therapist	YES	NO		
OBJECT ORIENTATION	Take tree leaves	YES	NO		
	Count tree leaves	YES	NO		
SHORT-TERM MEMORY	Helmet place	YES	NO		MEMORY
	Horse-brush place	YES	NO		
	Straw place	YES	NO		
	Stable places	YES	NO		
LONG TERM MEMORY	Repeat his name	YES	NO		

	Repeat therapists' names	YES	NO		
	Repeat horse's name	YES	NO		
FINE	Touch object	YES	NO		MOBILITY
	Touch textures	YES	NO		
	Brush the horse	YES	NO		
	Take out straw	YES	NO		
	Put the helmet away	YES	NO		
	Feed the animals	YES	NO		
	Reach stirrups	YES	NO		
	Command horse with feet	YES	NO		MOBILITY (HORSE IN MOVEMENT)
	Move hands to guide the horse	YES	NO		
	Look to the sides	YES	NO		

GROSS	Turn	YES	NO		
	Ride with only right hand	YES	NO		
	Ride only left hand	YES	NO		
	Ride with no hands	YES	NO		
	Touch his feet	YES	NO		
	Blend forward	YES	NO		
	Exercises no feet and no hands	YES	NO		
	Move to both sides	YES	NO		
IMITATES GESTURES	Grab and throw off (coloured sheet)	YES	NO		COGNITION
	Smell	YES	NO		
	Catch	YES	NO		
	Take out- put in	YES	NO		
POINTS TO/ DIFFERENTIAT	Human body parts	YES	NO		
	Horse body	YES	NO		

ES	parts				
POSTURES	Lie down	YES	NO		RELAXATION
	Bend forward	YES	NO		
	Cross	YES	NO		